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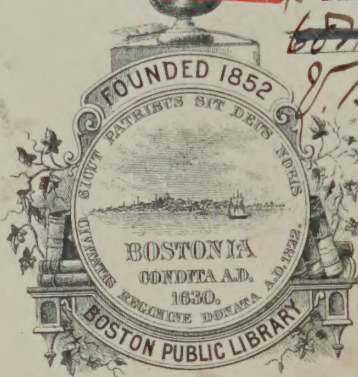
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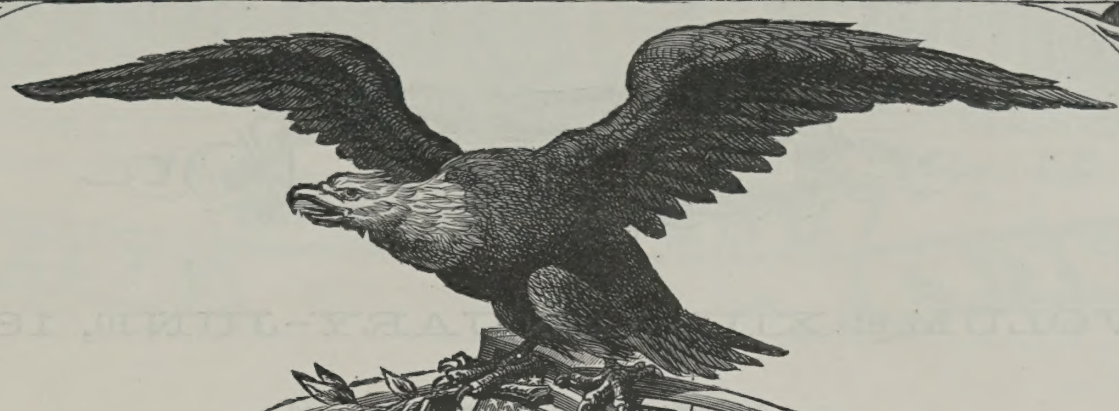
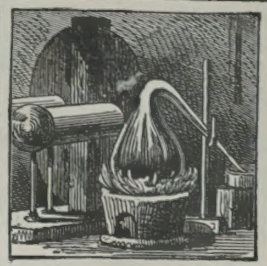












# SCIENTIFIC AMERICAN

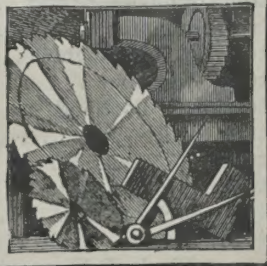
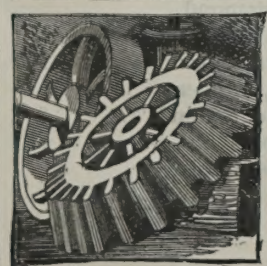


## ARCHITECTS AND BUILDERS EDITION.

Vol. XIII.

JANUARY-JUNE,  
1892.

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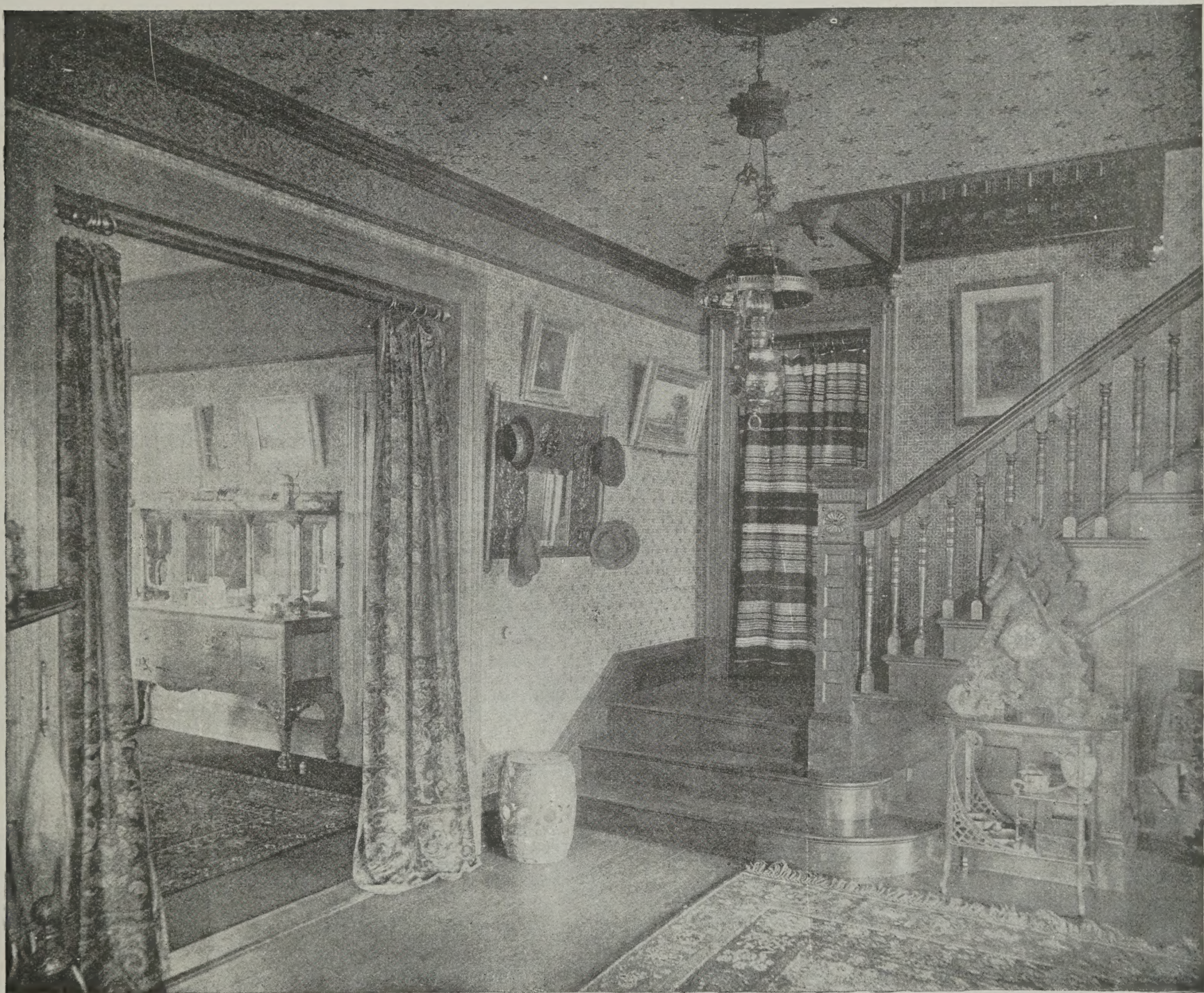
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A RESIDENCE AT BLACK ROCK, CONN.—VIEW IN HALL LOOKING INTO DINING ROOM.

[See colored plate and pages 2 and 6.]



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THE

## Scientific American,

ARCHITECTS AND BUILDERS EDITION.

\$2.50 a Year. Single Copies, 25 cents.

This is a Special Edition of THE SCIENTIFIC AMERICAN, issued monthly. Each number contains about forty large quarto pages, forming, practically, a large and splendid Magazine of Architecture, richly adorned with elegant plates in colors and with fine engravings; illustrating the most interesting examples of modern Architectural Construction and allied subjects.

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Of the January number of the ARCHITECTS AND BUILDERS EDITION of SCIENTIFIC AMERICAN.

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### A RESIDENCE AT BLACK ROCK, CONN.

One of our colored plates this month represents "Albreeze," the summer residence of Gen. Thomas L. Watson, at Black Rock, Conn. For another perspective view of the same house see page 6, and for an interior view see page 1.

This structure, which is treated in the American Renaissance style of architecture, is situated on Grover's Hill, at Black Rock, Conn., the most prominent location on Long Island Sound. The design is very picturesque. The roof lines are graceful, and it has many pleasing features, including a spacious piazza extending on three sides of building, *porte-cochere*, balconies at second story, tower, and ornamental chimneys. Dimensions: Front, 42 ft.; side, 63 ft. 6 in., exclusive of piazza and *porte-cochere*. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 8 in. The underpinning is built of rock-faced bluestone, laid up at random, with brick jambs. The superstructure above is built of wood, with the exterior framework sheathed; the first story clapboarded and the second and third stories shingled; all stained a chocolate brown with Cabot's creosote stain. Roof shingled and stained similar. The first floor is trimmed with ash, finished natural. The doors and windows have beaded casings, and turned, sunk angle blocks. The staircase in hall is turned out of natural cherry, and is provided with an ornamental newel, balusters, etc. This hall has a polished floor of ash. Hall, parlor, and dining room are provided with open fireplaces, built of brick and terra cotta, with hearth laid with same. The mantels are of excellent design. Dining room has an old casement window, glazed with stained glass, which throws a soft and mellow light over this apartment with pleasing effect. Den is fitted up similar to the other apartments. Kitchen, pantries, and laundry are isolated from the rest of building, and are fitted up in the best possible manner with the various appointments. Second floor is trimmed with whitewood, finished natural, and it contains five bed rooms, man's bed room, and bath room, the latter wainscoted and fitted up replete. Third floor is trimmed with yellow pine, finished natural, and it contains three bed rooms, besides ample storage. Cemented cellar contains furnace and other necessary apartments. Mr. Henry A. Lambert, architect, Bridgeport, Conn.

Our plate and engravings were made direct from photographs of the building taken especially for the SCIENTIFIC AMERICAN.

### A COLONIAL HOUSE.

We present herewith as the subject of one of our colored plates a house, colonial in treatment, erected for John Calvin Stevens, Esq., at Portland, Maine, from plans prepared by the proprietor. Dimensions: Front, 30 ft.; side, 40 ft., exclusive of front porch and platform. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The design shows a very odd and tasty bit of rural architecture. The first story is built of brick, which protrude at random, giving dots of shadows, playful in their effect. Above this brickwork the walls are shingled and left to weather-stain. Roof shingled. Within the rooms are varied in their treatment. Vestibule has Dutch doors. Hall and library are trimmed with whitewood, deepened slightly in color. The hall contains a very handsome staircase, with colonial columns extending to ceiling. The space between these columns is filled in with spindle work. Parlor is finished in old ivory white. The walls are in grayish blue, while the ceiling is in light olive brown. Dining room is stained a deep mahogany. This room has a paneled dado five feet in height, and the walls and ceiling above are colored with burnt sienna. The fireplaces are fitted up complete, with tiled hearths and hard wood mantels. Kitchen is wainscoted and trimmed with yellow pine, finished natural. It contains range, sink, wash trays, large pantries and lobby large enough to admit ice box. Second floor contains four bed rooms, large closets and bath room, trimmed with white pine finished natural. Bath room is wainscoted and is fitted up replete. Cemented cellar under whole of house, containing furnace and necessary apartments. Cost, \$3,800 complete.

Our plate was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

### A RESIDENCE AT BRIDGEPORT, CONN.

We present on page 4 one of the most attractive and picturesque looking houses at Sea Side Park, Bridgeport, Ct., which has been erected for J. A. Barri, Esq. This is an admirable design, both in arrangement and appearance. The ample piazza and balconies, the fireplaces and window seats, all are fine features. The hanging balconies attached to the pagoda on top of house afford very pleasant retreats. The first story is built of pressed brick, with brownstone and terracotta trimmings, and the superstructure above is built of wood, with the exterior clapboarded and painted red, with trimmings of a darker shade. Gables are paneled. Roof is covered with octagonal cut slates and is finished with a terra-cotta cresting and dragon finials. Dimensions: Front, 46 ft.; side, 50 ft., exclusive of piazza.

Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The interior throughout is cabinet, trimmed with ash. The hall, entered from a vestibule, is spacious. It has a floor laid with unglazed tiles and contains a large open fireplace with hearth and facings of tiles and a cabinet mantel of excellent design. The wall has a paneled dado, and the ceiling is beamed and ribbed. The staircase is located at the rear of hall, and is a very ornamental one, with columns extending to ceiling. Between these posts there are Gothic arches. Parlor is good size, well lighted, and contains a fireplace similar to one in hall. Library and dining room each have a paneled dado and a fireplace built of buff brick and provided with a tiled hearth and mantel. The latter contains a buffet built in, with a stained glass window. The windows throughout have transoms glazed with stained glass, which shed a pleasant light over the various apartments. Kitchen, pantries and rear hall are wainscoted and provided with the usual fixtures in the best possible manner. There are five bed rooms, large closets and bath room on second floor. Each bed room is provided with a stationary wash bowl. Bath room is wainscoted and replete. There are two bed rooms and trunk room on third floor, besides a staircase leading to studio, which is located in tower. The walls and ceiling of this studio are paneled with narrow beaded stuff, and it also contains an open fireplace. Cemented cellar contains laundry, furnace and other necessary apartments. Cost \$18,000 complete. Paliser & Paliser, architects, New York City, N. Y. Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

### A COTTAGE AT RICHMOND, MO.

On page 7 we give a perspective and plans of Mr. J. T. Patten's cottage at Richmond, Mo., built recently. The foundation is of stone, with brick piers for the porches. Not excavated, except for ash pit and under rear of building for cellar. Exterior walls are sheeted with common boxing and covered with half-inch bevel siding and the gables shingled. A quarter circle porch, with circular steps, covers the front entrance. There is also a side and a rear porch. Cellar entrance from back porch. Vestibule has an ornamental window. All other windows are glazed with D. S. A. glass. Height of story, 11 ft. Kitchen wainscoted 2 ft. 8 in. high. All other rooms have moulded base, and all rooms have moulded casings, corner or head and plinth blocks. There are two pairs and one single sliding doors. All except front doors are five panel P. G., best quality white pine. The principal rooms have picture mould. The parlor is finished in gum, all other rooms in yellow pine. All have natural wood finish. Kitchen has iron sink and waste. The library is furnished with a grate and hard wood mantel, with bevel plate mirror. Door and window trim is bronze. Cost about \$1,600. J. E. Cowdery, architect. L. P. Garrett & Co., builders. Our plate was made from a photograph of the building specially taken for the SCIENTIFIC AMERICAN.

### A MOUNTAIN COTTAGE.

We publish in this issue, on page 9, two floor plans and a view of a mountain cottage in Massachusetts, designed by the late H. H. Richardson.

The exterior is of rough rock-faced random rubble, and the general effect is very picturesque. A loggia runs round two sides of the house, from which a pleasant view of the surrounding country is obtained. Two reception rooms connected by sliding doors, each having an angle fireplace. There is a large entrance hall, and the staircase is arched off this hall. The den is 11 ft. 6 in. by 18 ft. The fireplace is extra large, to burn cord wood. The dining room is 12 ft. by 18 ft. and is conveniently arranged with a butler's pantry and the kitchen. On the second story are five bed rooms, a general toilet room, and a private toilet room connected with the best bed room. The estimated cost of this cottage is \$10,000. There are two attics and a large trunk room which is conveniently arranged to the second story staircase. The house is cellared underneath the kitchen and dining room and rear hall. Foundation walls being 20 inches thick. The grounds are left in their rough natural state, the foot paths, etc., artistically arranged with the rise and fall of the grounds. The general effect is very pleasing and in perfect keeping with the surrounding scenery. Our engraving was prepared for the SCIENTIFIC AMERICAN direct from a photograph of the building.

If any of our readers have made an invention for which they have thoughts of taking a patent, they are invited to communicate with Messrs. Munn & Co., the publishers of this paper, who for a period of forty-three years have conducted a most successful bureau in this line. A pamphlet of instructions will be sent free, containing full directions how to obtain a patent, costs, etc. In very many cases, owing to their long experience, they can tell at once whether a patent probably can be obtained; and advice of this kind they are always happy to furnish free of charge. Address Munn & Co., SCIENTIFIC AMERICAN office, New York.



# THE DREXEL INSTITUTE OF ART, SCIENCE, AND INDUSTRY.

By the generous action of one of Philadelphia's noble citizens, a magnificent institution for industrial learning has been established in that city; and on December 17 the beautiful structure was the scene of dedicatory exercises of a highly interesting nature.

The institute was built and endowed by Anthony J. Drexel, head of the great banking firm of Drexel & Co., and its scope and objects as outlined by him "are the extension and improvement of industrial education as a means of opening better and wider avenues of employment to young men and women."

The building was erected at a cost of \$600,000, and Mr. Drexel has endowed it with a fund of \$1,000,000.

Mr. Chauncey M. Depew, of New York, made the dedicatory address. He was followed by Wayne MacVeagh, who presented, on behalf of Mr. Drexel, the deeds of trust conveying the building and endowment funds. Dr. James McAllister, president of the institute, responded.

The institute is located at Thirty-second and Chestnut Streets, West Philadelphia. The building is in the style of the classic Renaissance, constructed of buff brick with terra cotta ornamentation, the base being of rock-faced granite. A richly decorated portal in Chestnut Street, 26 feet wide and 35 feet high, forms the principal entrance. This admits to a portico of colored marbles and paneled oak ceiling, which in turn opens into a spacious hall, the ceiling of which is supported by pillars of red Georgian marble. Beyond is a great central court, 65 feet square and the entire height of the building, and covered with a ceiling, the center of which is of stained glass. A double marble stairway leads to the upper floors and descends to the auditorium and the workshops in the basement. Broad galleries extend around the court on the second and third floors. These are supported and inclosed by arcades. From these galleries entrance is afforded to the class rooms, laboratories, and studios, all of which are lighted from without. The portico, entrance hall, and central court are wainscoted in marble; the arcades are faced with enameled bricks, and the dividing cornices are of terra cotta. The woodwork throughout the building is of polished oak.

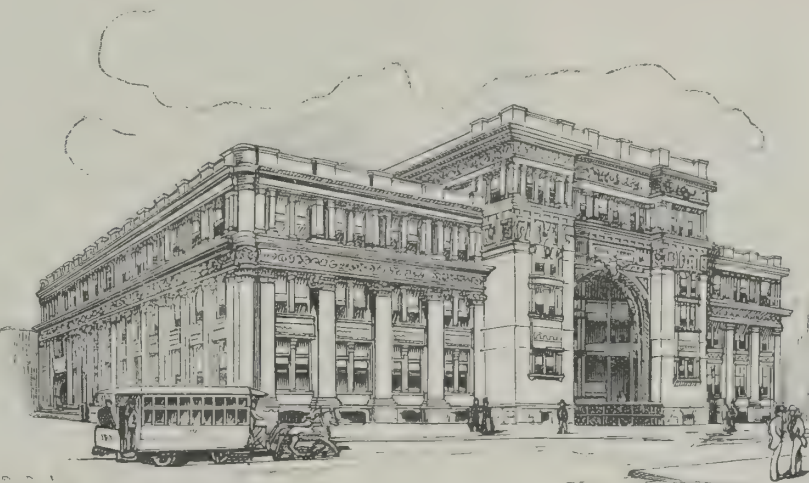
The offices, library, and reading room are on the first floor. There is a lecture room, with a seating capacity for 250 students; the auditorium is capable of seating 1,500 persons. A grand organ occupies the space back of the stage at the eastern end. The seats in the auditorium consist of rows of upholstered arm chairs. The class rooms are commodious, averaging from 43 by 34 to 56 by 44 feet. There are three physical laboratories on the second floor, the chemical laboratory being on the third floor, and the gymnasium on the fourth floor front. These connect with bath and dressing rooms. The photographic studios and laboratory are in the rear on the fourth floor. Cloak rooms and lavatories, finished in marble and oak, are placed in all four stories of the building. The trustees' room is on the second floor. The shops for mechanical work are in the basement, as are also the steam and electric plants.

The object of the institute is the extension and improvement of industrial education as a means of opening better and wider avenues of employment to young men and women. The plan is comprehensive, the aim being to provide liberal means of culture for the masses by means of lectures, evening classes, library, and

museum. It is expected, however, that modifications will be made as the growth of the several departments and the experience gained in conducting them may require.

The work of the institute will be arranged under the following general divisions: 1, Art Department; 2, Scientific Department; 3, Department of Mechanic Arts; 4, Department of Domestic Economy; 5, Technical Department; 6, Business Department; 7, Department of Physical Training; 8, Normal Department for the Training of Teachers; 9, Department of Lectures and Evening Classes; 10, Library and Reading Room; 11, Museum.

Independent of the regular departments, students will have the option of taking such courses as they may elect and can advantageously pursue. Other departments will be added as the need or demand for them becomes apparent. A department of choral music will probably be instituted at an early day. A



THE DREXEL INSTITUTE OF ART, SCIENCE, AND INDUSTRY.

system of free scholarships will be established for the regular and special courses.

In order to guard against the abuse of the privileges of the institute, fees will be required, but the liberal endowment of \$1,000,000 is designed to make the charges moderate, and all moneys received will be applied to the maintenance of the work of the institute. Deposits will be required to guard against loss through breakage in the laboratories. Students will be expected to supply text books, and those in the millinery and dressmaking classes will provide part of the materials used, but all tools and materials used in the workshops will be furnished by the institute.

## STAFF.

It is estimated that about thirty thousand tons of staff will be used in the finishing of the buildings of the World's Columbian Exposition, this material being employed on nearly all the structures. The illustration given below represents one of the rooms of the Staff Decorative Co., who are now employing about two hundred men making this material, which is fireproof and is furnished in shapes and forms suitable to be nailed to the frames of the buildings, inside and out. Fig. 1 represents the raising of the gelatine mould from the cast and Fig. 2 shows the fluting of the large columns for the Electrical Building. Gelatine is now more largely used than any other material for the moulds, although when there is no undercut, plaster, wax or sulphur moulds may be employed, or wood or metal forms. The staff itself is a composition of plaster

of Paris and fiber, with some other materials, as alumina, glycerine, dextrine, etc., according to the special casting which is to be made or the kind of mould employed. To prevent brittleness, the material is cast around coarse cloth bagging or oakum. This material was first used in the Paris Exposition buildings of 1878. Its natural color is a murky white, but other colors may be produced by external washes, while the castings may be made to accurately represent cut stone, rock-faced stone, mouldings, and the most delicate designs of every kind. For the lower portion of the walls the material is mixed with cement to make it hard.

## Durability of Redwood.

The Santa Barbara authorities recently investigated the lasting qualities of redwood, in order to decide whether to use redwood or stone for a bulkhead for the proposed esplanade.

The following are the questions and answers received in regard to Santa Cruz redwood:

From E. L. Van Kleek: How long will this redwood last under ground or in salt water? Answer—Without any decay at all, it will last 25 years. Some will last much longer; 6 × 6 posts have been removed perfectly sound after being in the ground over 30 years.

How long would it remain sufficiently sound to hold spikes, or until one-third of a 6 × 8 timber would decay, while constantly wet with salt water? Answer—In some cases, 30 years. I am told by some that the kind of lumber described will last forever.

How long would 6 × 8 piles last, where they are constantly wet with salt water to four or five feet above ground? Answer—Salt water being a good preservative, I should think they would last 35 years.

How long would it remain sound in the ground where there is salt water, or where it would be alternately wet and dry? Answer—Thirty years.

How long would 2-inch plank last in a retaining wall, with earth more or less damp or wet on one side, and the other side dry, or exposed to the weather? Answer—Dampness does not seem to have any decaying effect on redwood. I should say such plank would last 20 years. All of this without any preservation. Coal tar as a preservative, applied hot, is as good as any I know.

From Charles Pierce: I have known some heavy black heart Santa Cruz redwood to lie under ground as long as 30 years without decay. This was in the case of a piece of 6 × 6 redwood used by myself for a gate post on my own premises.

Russell Heath: I have fence posts of redwood on my farm, the same having been in the ground 32 years, and they are sound, free from decay.

John P. Stearns: I know of a timber of Santa Cruz redwood that was 41 years under and in moist ground, and remained sound, free from decay.

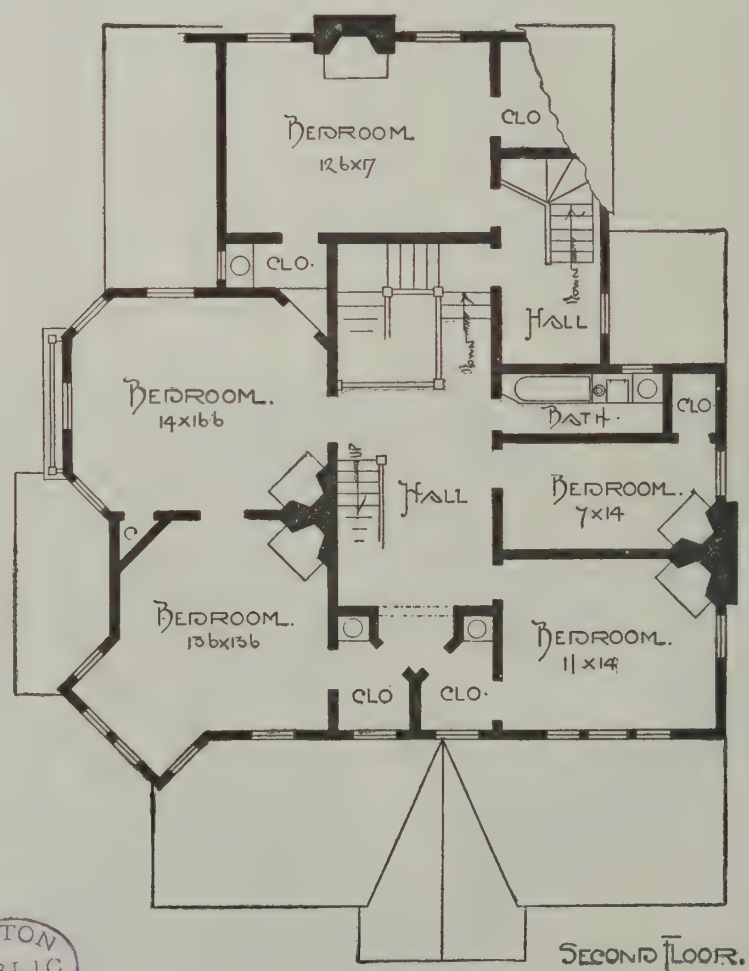
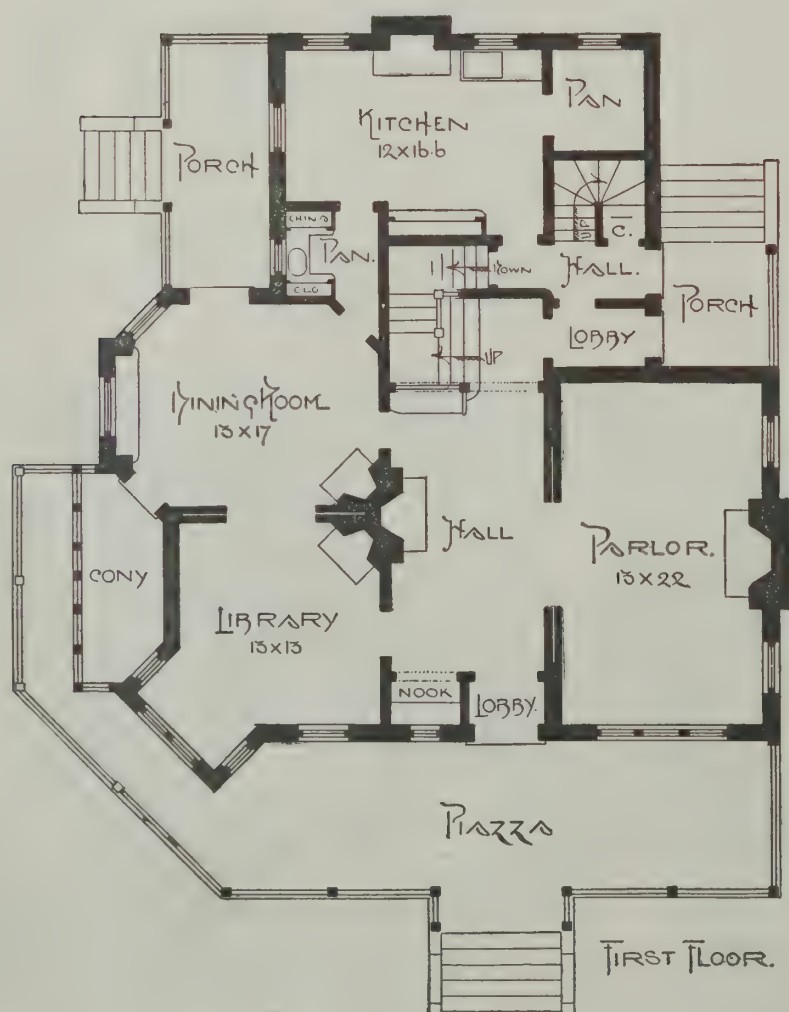
G. P. Tebbetts: I know of common redwood posts that have been set in Santa Barbara over 25 years, and are sound to-day.

WHEN the nickel trimmings of stoves get tarnished, make a paste of soda and ammonia and rub it on with a tooth brush. Remove the paste with a piece of old flannel and polish the trimmings with chamois. The mica in the doors of heaters and stoves can be cleaned with diluted vinegar.



THE WORLD'S COLUMBIAN EXPOSITION—MAKING OF "STAFF" DECORATIONS.





[See page 2.]

A RESIDENCE AT BRIDGEPORT, CONN.









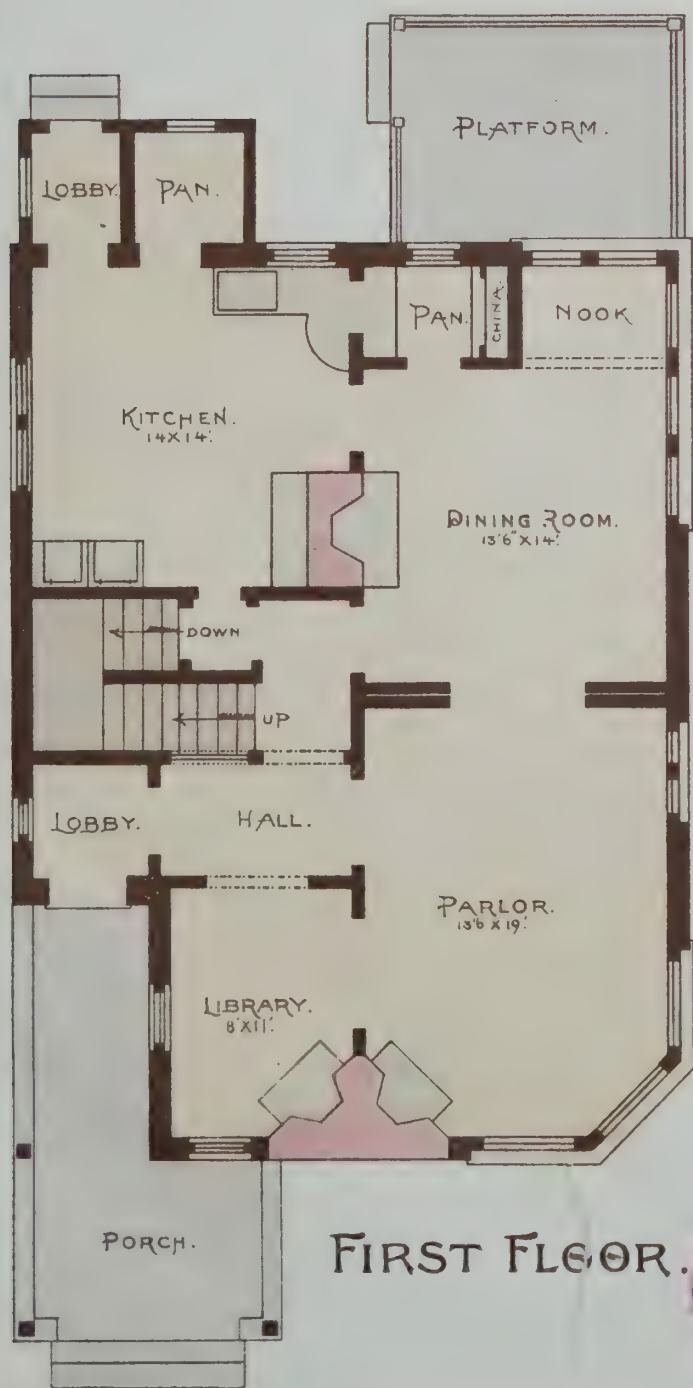
A RESIDENCE AT BLACK ROCK, CONN.



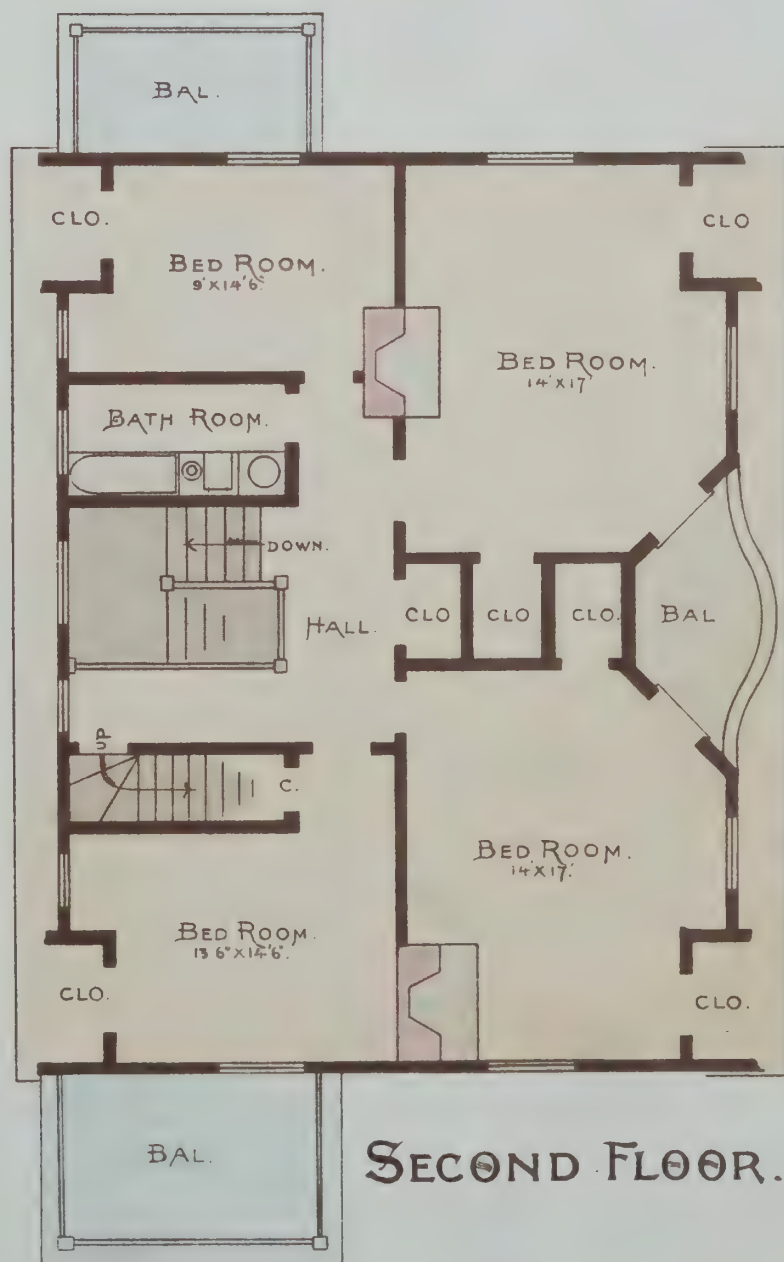




A COLONIAL HOUSE.



FIRST FLOOR.



SECOND FLOOR.









## THE PARSONAGE AT GARDNER, MAINE.

We publish on page 10 a design of substantial construction, with a pleasing exterior and a roomy interior, erected as the parsonage of the First Baptist Church, at Gardner, Maine. Dimensions: Front, 34 ft. 6 in.; side, 40 ft. 6 in., exclusive of piazza and shed. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. Underpinning, brick. The first story is clapboarded and painted light olive green, with trimmings of a darker shade; second story and gables are covered with cedar shingles, stained sienna. Roof, shingled and painted red. The interior throughout is trimmed with whitewood, finished natural. Hall contains an ornamental staircase turned out of ash. This hall, dining room and kitchen have hard wood floors, laid with birch in narrow widths. Parlor and library are separated by double sliding doors, the latter containing an open fireplace furnished with a tiled hearth and a hard wood mantel. Kitchen is wainscoted and contains sink and a large well fitted up pantry. This house has the customary shed attached which is so frequently seen in this vicinity. There are four bed rooms, large closets, study and bath room on second floor and one room and storage on third floor, all replete. Bath room is wainscoted with birch. Cemented cellar contains furnace and other apartments. Cost \$2,500 complete. Mr. Lewis, architect, same place.

Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

## FIRST BAPTIST CHURCH, GARDNER, MAINE.

We present on page 11 a ground plan and perspective, reproduced from a photograph of the building, taken especially for the SCIENTIFIC AMERICAN, of the new First Baptist Church recently erected at Gardner, Maine. The church, as now completed, is one of the most picturesque and best appointed of its class. The aim has been to show, by constructional outlines, the general character of the building, to avoid all unnecessary ornamentation, and also to obtain the greatest accommodation for the amount expended. The underpinning is built of granite, and the building above this is of wood; the exterior framework being sheathed and then covered with cedar shingles, stained sienna, with trimmings painted light brown; roof shingled, and painted red. The auditorium is 44 by 45 and the school room 30 by 34. This auditorium has a seating capacity of three hundred, and an addition of one hundred and seventy-five in school room, the latter being connected with doors that slide up into roof. The interior is trimmed with cherry, in a very handsome manner. The building is lighted with stained glass windows, with pleasing effect. The walls are colored with burnt sienna, giving it a very rich tone. The library is well fitted up, and is conveniently located. Stairs at front and rear lead to basement, which contains a kitchen, provided with the usual fixtures, and a large dining room. This basement contains, also, two large furnaces. Cost, \$8,000 complete, including furniture, decoration, furnaces, and organ, which cost \$1,275. Contract price of building, exclusive of the above, was \$6,900. John Calvin Stevens, architect, of Portland, Maine.

## A RESIDENCE AT BRIDGEPORT, CONN.

Our engravings, page 13, illustrate in perspective and plans the house built for Mr. J. H. Cogswell, located on Norman Street. Height of stories: Cellar, 7 ft.; first floor, 9 ft.; second floor, 8 ft. 6 in. Cellar under the whole house. Water closet and laundry in the cellar. Cellar bottom is cemented. Stone foundation, slate roof. The outside is finished with clapboards and shingles, with Venetian glass windows in front hall, and landing of stairs, and in the attic. Has electric bells, speaking tubes, etc. Hall, parlor, sitting and dining rooms are finished with whitewood, antique design. Hall, parlor, sitting and dining rooms are finished in cherry, with a dead finish. Kitchen finished in the natural wood. Fireplace in the sitting room, with tile hearth, faced with tile, brass rail, and ornamented linings. Second floor is finished in whitewood, same design as first floor and finished in the natural wood. Bath room is finished with ash. All plumbing is open. House is heated all through with hot air. Cost, \$3,400 complete. A Murray Jenks, architect. Our engraving was made direct from a photograph taken specially for the SCIENTIFIC AMERICAN.

## Is Iron Rust a Cause of Fire?

When oxide of iron is placed in contact with timber excluded from the atmosphere, and aided by a slightly increased temperature, the oxide will part with its oxygen, and is converted into very finely divided particles of metallic iron having such an affinity for oxygen that, when afterward exposed to the action of the atmosphere from any cause, oxygen is so rapidly absorbed that these particles become suddenly red hot, and if in sufficient quantity will produce a temperature far beyond the ignition point of dry timber. Wherever iron pipes are employed for the circulation of any heated medium, whether hot water, hot air, or steam, and the pipes allowed to become rusty, in close contact with timber,

it is only necessary to suppose that under these circumstances the particles of metallic iron become exposed to the action of the atmosphere, and this may occur from the mere expansion or contraction of the pipes, in order to account for many of the fires which periodically take



KANSAS CITY—THE NEW MASONIC TEMPLE.

place at the commencement of the winter season.—*Boston Jour. of Com.*

## THE GERMAN HOUSE IN CHICAGO.

The German House, which has just been commenced in Chicago, promises to be a truly gigantic undertaking of modern architecture, as will be seen from the accompanying illustration. The main object of the building is to provide a large German theater which can be used every evening, as well as the necessary halls for concerts and other meetings of the German population of Chicago, but at the same time to draw from the building itself the necessary funds to



THE GERMAN HOUSE, CHICAGO.

meet the expenses of maintenance, etc. The combination of these various objects could be accomplished only by the erection of a tower-like edifice, and the architects had to solve the problem of designing a building covering a ground surface of 1,000 sq. ft. and 165 feet high, without sacrificing the sense of beauty,

and not forgetting that their work must be complete, the greatest care being given to the requirements of each separate room. As it was impossible to fit any historical style of architecture to this extraordinary building, a new style had to be invented for this special case. The walls and arches are to be of stone or brick, with a frame of steel girders and beams, and a filling of hollow bricks, and for the sake of economy many windows must be provided, thus preventing the erection of large wall surfaces, that light and air may be supplied to all parts of the building. Antique halls, with pillars, Roman and Gothic pointed arches and the ornamentation of the Renaissance were out of the question; but nevertheless the architects hope to produce a structure which will combine beauty and usefulness.

That the details of the building may be better understood, we will state that the front on Randolph Street is 80 ft. wide and 181 ft. deep. In the basement are, besides the necessary engine rooms, etc., the cloak rooms, the meeting rooms for the theater, and also a restaurant arranged like a "rathskeller." On the ground floor is the main entrance, which is 40 ft. wide, and on each side of this a store to be rented. The theater will contain 1,257 seats, and will extend up through five stories of the front building, so that the seats in the parquette and galleries can rise one above the other, allowing the spectators to see the stage over the heads of those in front of them. The galleries are provided with iron supports, so that the entire auditorium will be free from pillars. On both sides of the parquette and the first gallery are passages which lead by the stage to the rear street, and which are also connected with lobbies. There are two lobbies for the parquette and one for each gallery, to save the spectators unnecessary steps during the intermissions. All the parts of the theater and stage, even the stairs, floors, galleries, etc., are made of metal or stone, so that it is impossible for the building to be destroyed by fire, especially as all the arrangements for the stage are of the very best, with a view to prevent any danger from fire. The stage is 40 by 80 ft., and the space above the stage is 71 ft. high; there are 19 dressing rooms connected with the stage. The auditorium and the stage are lighted by 1,400 electric lights, and are heated by warm air, delivered by apparatus which can also be used for ventilation.

Two other halls for balls, concerts, weddings, etc., are arranged in the twelfth story, being provided with reception rooms and dressing rooms. The eleventh story is given up to a social club, and contains a large dining room, besides a number of reading rooms, billiard rooms, card rooms, etc.; while the tenth story is used for a large restaurant with dining hall, small dining rooms, kitchens, etc. The side wings of the building are to be used for a hotel, and contain 131 rooms for guests, 38 bath rooms, and 10 rooms for servants, besides reception rooms and business apartments such as are needed in large hotels. Five fans are provided for changing the air in the upper stories as well as in the basement, and these are driven by electricity; more than 2,500 incandescent lights are provided, and the building is heated by steam pipes.

For the foundation 900 piles were driven into the ground, and on these a frame of iron beams is to be erected. The wall of the theater will be three feet thick, and on this will rest the wrought steel supports for the eight stories above the theater. There will be four passenger elevators and one freight elevator in this remarkable building.—*Illustrierte Zeitung.*

As soon as an asphalt street is down, the traffic all goes there. Thus the asphalt pavement falls a victim to its own excellence. I have heard a great deal about that celebrated Appian Way and the other Roman roads. It is no wonder they stood, for the Romans used wooden wheels 12 inches on the face.

Years ago 1,500 pounds was considered a load for one horse on cobbles, with wheels 3 inches on the tread; farmers came in with 6 inch wheels. To-day 8,000 pounds is a common load for a pair of horses (or say 3,500 pounds net per horse) with 2½ to 3 inch wheels. Our present roads will not bear this traffic.—*Bullock.*

## PATENTS.

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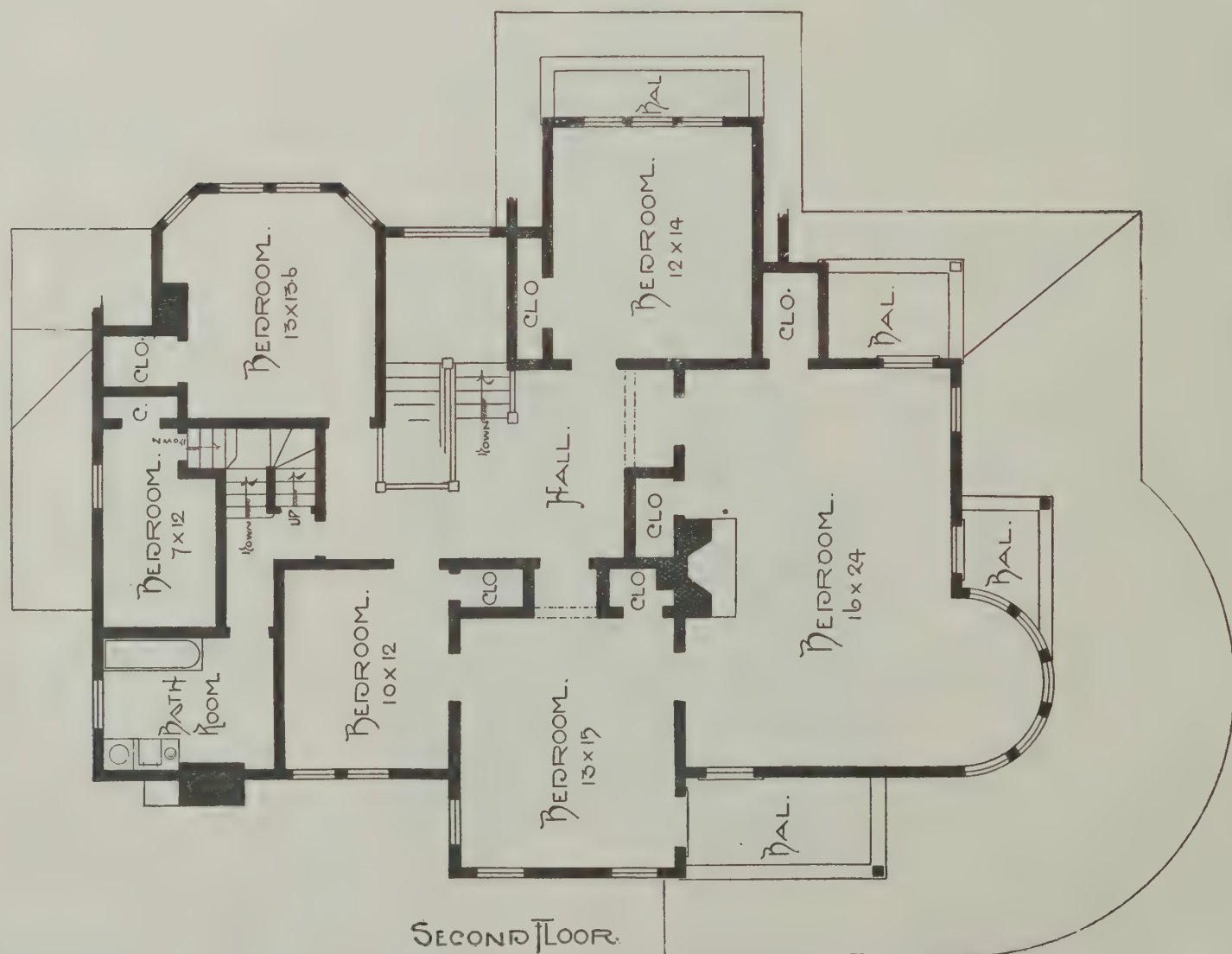
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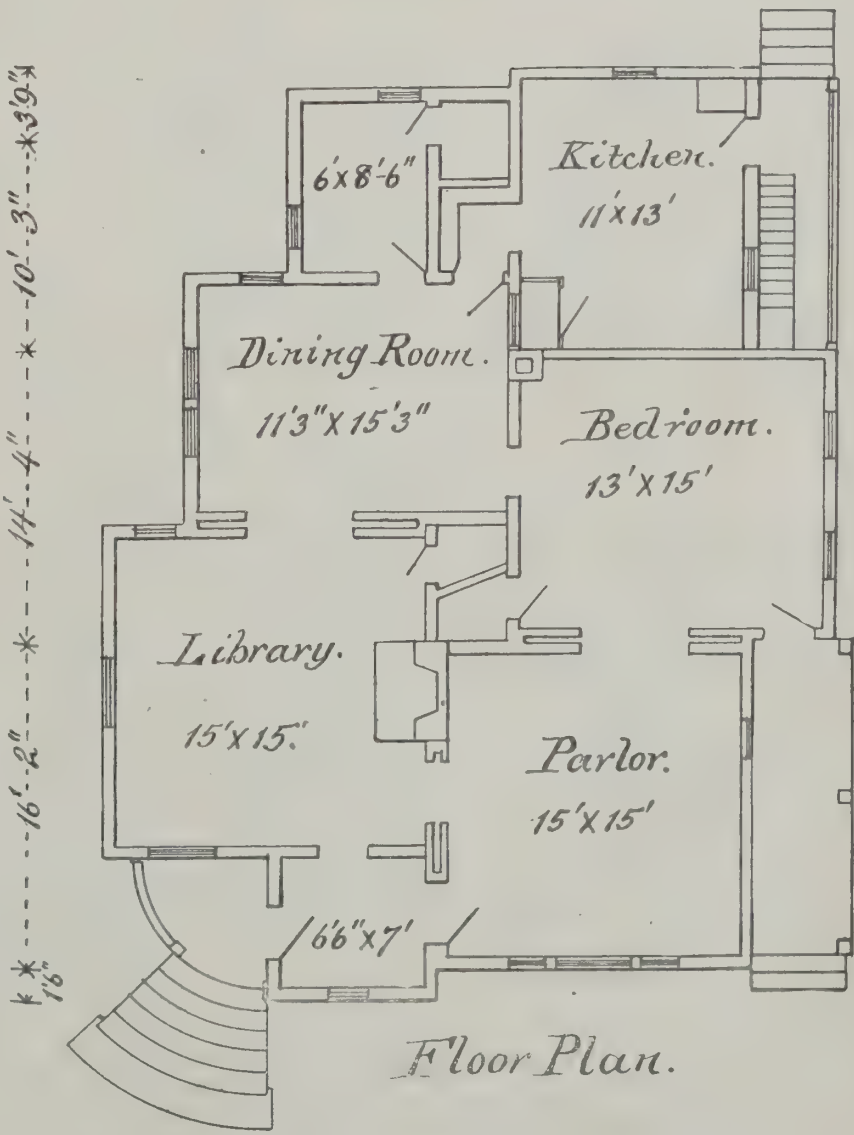
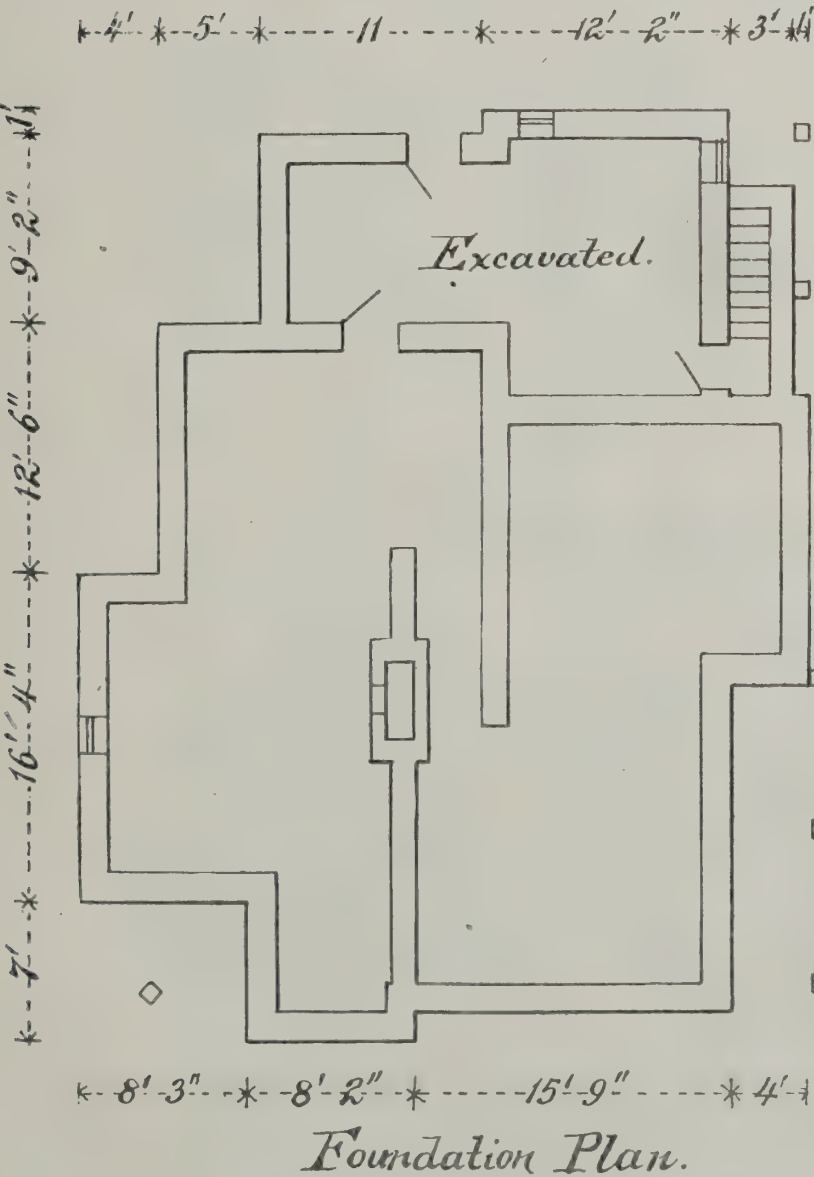


[See page 2.]

A RESIDENCE AT BLACK ROCK, CONN.







[See page 2.]  
A COTTAGE AT RICHMOND, MO.





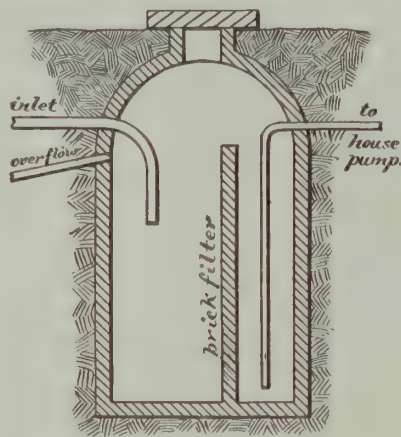
## TYPES OF CHAIRS, OLD AND MODERN.

The ancient chair which figures first on this sheet is supposed to be Etruscan. Executed in marble, it is carved in low reliefs representing a procession of warriors, a boar hunt, etc. It is now in the Corsini Palace, Rome. Unsuitable from its weight for anything but a state chair, still it is an object of great beauty; and, from the fact that it must be one of the oldest chairs extant, obtains a prominent place on our page. The well framed chair next to it, with a pronounced Roman character, is a good type. Somewhat uncommon features are the perfectly straight arms and the arch and baluster work under the seat. It has an official appearance and would look well at the head of a table in a committee or board room. The "Georgian" is the antithesis to the formality of the last. The curved arms, bent supports, and widely spread legs give it a jaunty air which suggests familiar conversation and the comforts of a glowing hearth. It was to be seen at the recent Naval Exhibition. The design emanating from the "School of Handicraft" is as simple as it is effective. The seat is covered with tan brown leather, and a broad piece of the same material, embossed and well padded, makes a suitable finish to the formal back. The first two chairs below form good furniture for a hall. The "Shakespearean" is a form familiar to us as being the product of the period to which our great national poet belonged. The high back seat next in order belonged to Thomas Wentworth, first Earl of Strafford, and has his arms carved thereon. It forms one of a set now preserved at South Kensington Museum. These two are, perhaps, not what would be called comfortable chairs according to present tastes; but then they were for use in times not given to the luxury of the present age—in an age, too, when life was passed more in the open air, and had little desire for that ease which now leads to many padded monstrosities. These latter bulge out into ever-varying forms, as fashion and a craze for novelty dictate. There is little doubt that if the old furniture designers were required to work for the present day, they would, without sacrificing the greater ease now demanded, give us something beautiful at the same time. The "King Charles," though of modern make, is a noticeable exception to our last remark, for it is as comfortable as it is dignified, being firmly made, well stuffed, and covered, moreover, with sumptuous Genoa velvet with stamped pattern. Space will not permit us to do more than call attention to the interesting chair from the studio of Mr. J. R. Reid, the talented painter; and the

obtained, which, after a period of from six to eight hours, has hardened into an extraordinary solid gray compound. This is polished with an agate stone, when it assumes the brilliant white color of metallic zinc. The material is then applied to damaged or faulty zinc ornaments and utensils, the reparation effected being of a permanent nature. This cement is adapted for use on stone and wood as well as on metals and glass.

## HOW TO BUILD A RAIN WATER CISTERN AND FILTER.

In reply to Z. and others we here give the form of cistern to be made of brick. Excavate the earth to the



required depth and lay in the brick, using a mortar of the best Portland cement. Single brick thickness is sufficient. The neck of the cistern is to stand just at or slightly above the level of the ground. In laying the bricks, put cement behind the bricks, so that when finished the entire exterior of the cistern will be covered with cement. The dividing wall of single brick forms the filter through which the water from the large receiving chamber will find its way. The whole interior of the cistern, except the filtering wall, is to be plastered

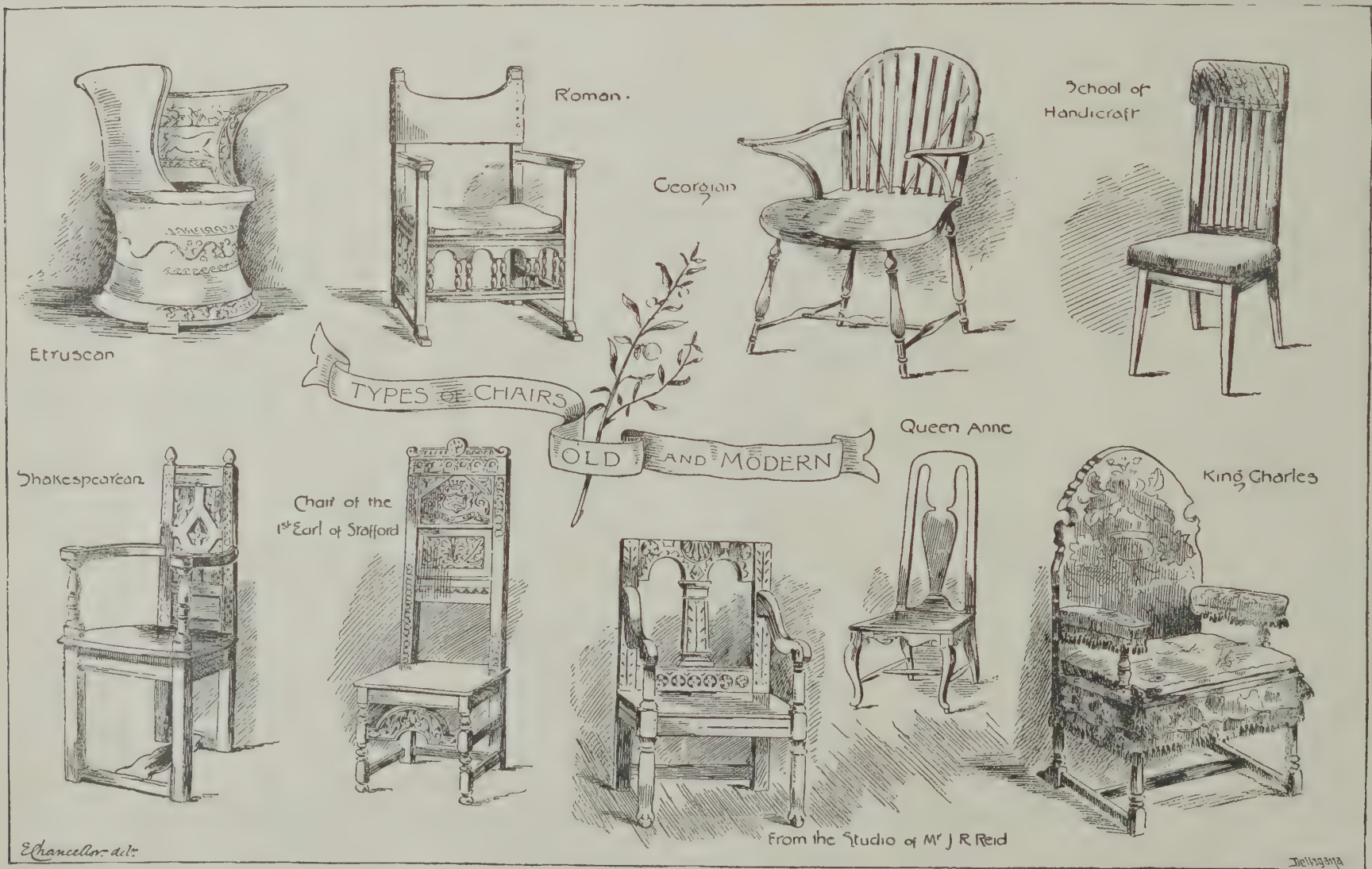
## A CHURCH OF MODERATE COST—\$2,400.

On page 14 we illustrate a village church recently built at Oneida, N. Y., from plans by W. Irving Tillotson, architect, of the same place, for St. Paul's Evangelical Church. The outside dimensions of the auditorium are 33 x 40 ft., of the session room or small chapel 12 x 20 ft.; the tower is 9 x 9 ft. outside. Height of auditorium at sides 15 ft., in center 22 ft. A cellar 6 ft. 6 in. high extends under the whole building, the walls being of local blue quarystone laid in courses above grade line. All the rough timber of the frame is of sound hemlock. The same is sheathed on outside with matched seasoned hemlock boards. The roof is boarded with square-edged hemlock boards, covered with building paper, and has sea green slate laid diagonally. The roof of the tower is covered with black slate with half hexagon ends. The cross at the terminal is of galvanized iron. All of the outside covering and trimmings are of white pine. The outside is vertically wainscoted around from the water table to the cap in line with the window sills. Above this, to the line of the gables, narrow beveled clapboards are used. The gables are shingled. The heads of outside doors and windows are gabled to harmonize with the inclination of the roof. The sashes are hung and have border lights of colored cathedral glass; the center lights are of figured obscured glass. The auditorium is connected with the vestibule by a fly door, also indirectly through the chapel, by passing through the sliding doors. The walls of the interior have vertical wainscoting as high as the window sills. Above this, together with the ceiling, two coats of Adamant plaster. All the interior trim is of North Carolina pine. The seats and railing along the platform are of oak, finished natural. The interior is lighted with gas; 250 persons can be comfortably seated in the auditorium and chapel. The outside has two coats of best white lead and oil. All the materials have been furnished and the labor performed for the sum of \$2,400.

## Bird Tracks in Stone.

Mr. E. F. Church, editor of the *Newtown Enterprise*, Newtown, Pa., during a recent excursion over the border line into New Jersey, found a stone having bird tracks indented in its surface. Mr. H. G. Woodman, of Langhorne, Pa., geologist, says:

"The stone is of Jura-Triassic shale, and was found in the valley of the Delaware River, near Frenchtown,



quaint and feelingly designed "Queen Anne," which possesses a charm all its own.—*Building News*.

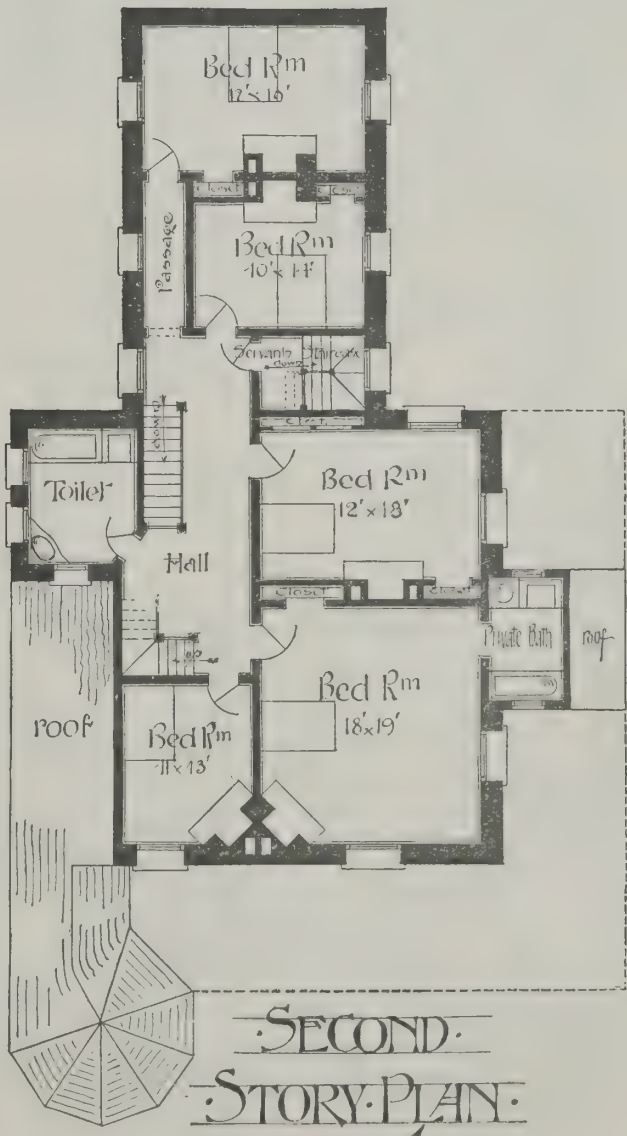
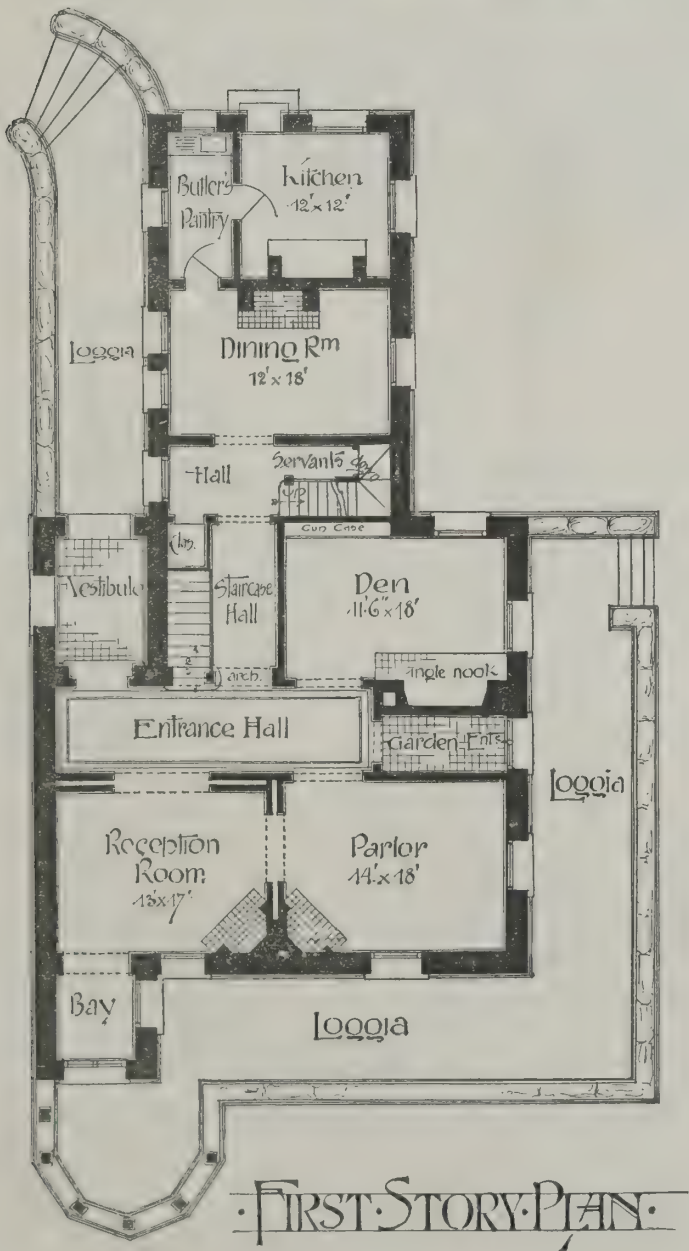
## Reparation of Zinc Castings.

According to *Iron*, flaws in zinc castings for ornamental work, or the like, can be concealed by the following preparation: A water glass solution of 33 de grees B. is well stirred with Spanish white, adding zinc powder (so-called zinc gray) until a thick plastic mass is

with cement, using Portland cement one part, clean sharp sand two parts. The receiving chamber will need to be occasionally cleaned. For the first few months of use the water will be rendered somewhat hard by the cement, but this will pass away, and after that pure soft water, suitable for all domestic purposes, will be enjoyed. Convenient dimensions for a small family are 6 ft. diameter, 8 ft. deep. But the dimensions may be made to suit.

N. J., a few miles below the northwestern limit of the Jura-Triassic formation. The tracks are 14 inches apart, 3 inches long, and 2 inches wide, and they probably belong to Hitchcock's order of "Brontozoums." The locality in which it was found seems to have been an extensive shore line in Triassic times, as ripple marks, sun cracks, as well as other fossil footprints, abound, and the geologist will be amply repaid for a careful examination."



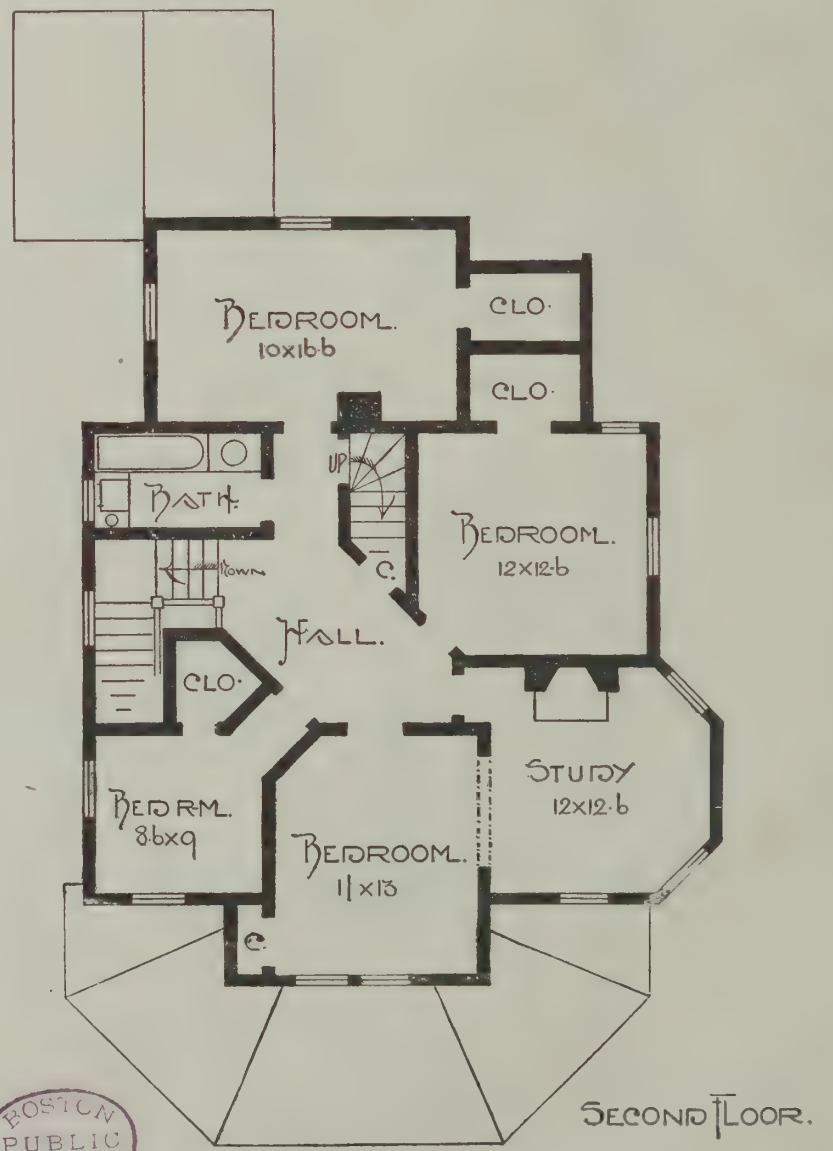
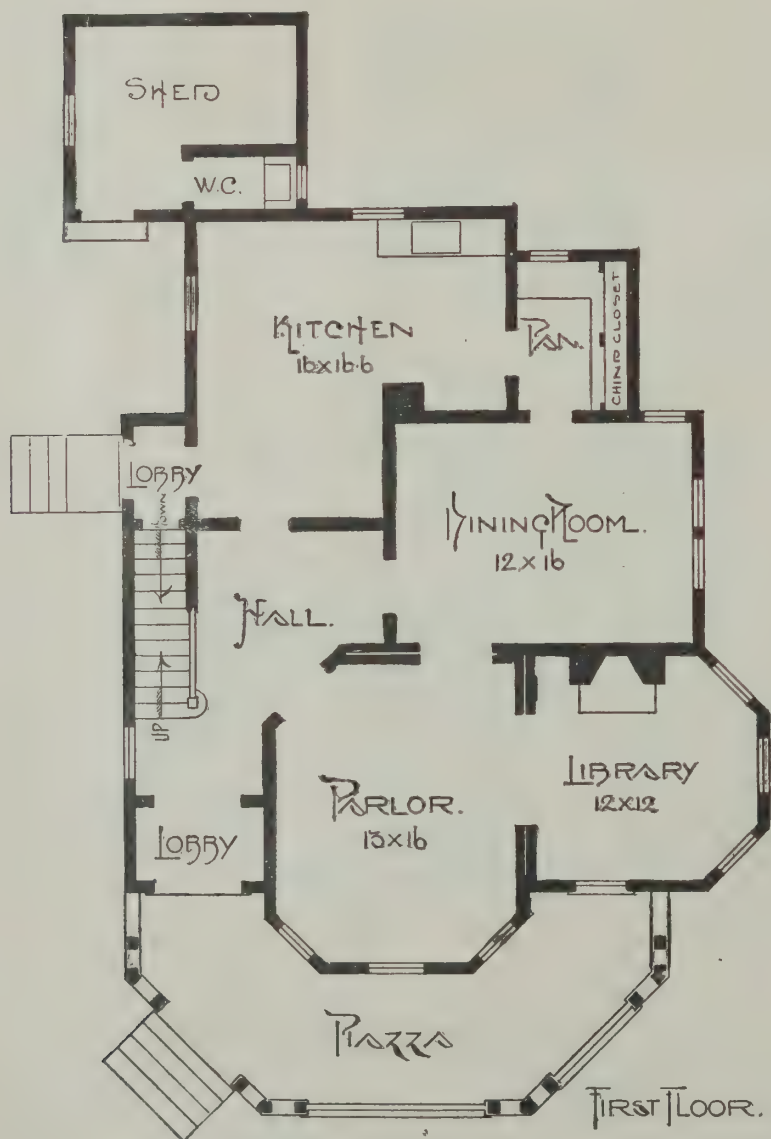


[See page 2.]

A MOUNTAIN COTTAGE.



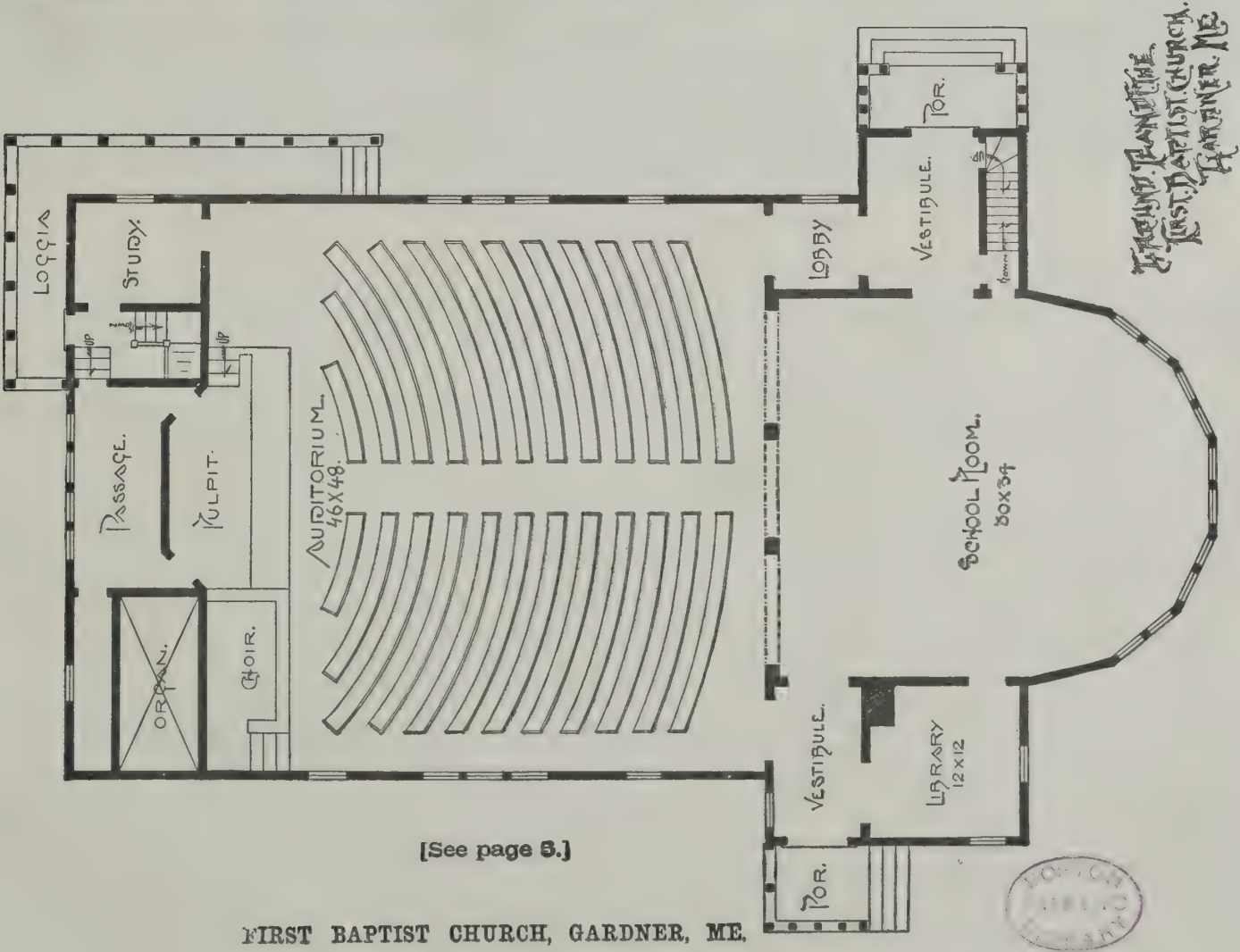




[See page 5.]

THE PARSONAGE AT GARDNER, ME.





FIRST BAPTIST CHURCH, GARDNER, ME.



#### A RESIDENCE AT ROCHESTER, N. Y.

The plate herewith presented represents the beautiful dwelling of Geo. C. Hollister, Esq., on East Avenue, Rochester, N. Y. Mr. James Cutler, architect. The building is of light red stone of very agreeable tint. The internal arrangements and appointments are of the most excellent description. Our plate was prepared direct from a photograph of the building by Miss Catherine Barnes, an amateur photographer of national reputation.

#### Steel Water Mains in Toronto.

In the last annual report of the superintendent of the Toronto (Canada) water works, Mr. W. Hamilton, there is an interesting description of the new steel conduits which have been constructed to increase the supply of water taken from Lake Ontario through the old 3 feet cast iron and 4 feet wood intakes. The description was prepared by Mr. W. C. Brough, the engineer of the department, and the following abstract is taken from the *Engineering Record*: The new submerged conduits are two in number, one 48 inches in diameter and 4,660 feet long, the other 60 inches in diameter and 6,027 feet long. The 60 inch pipes are made in lengths of 56 ft. 9 in., and the flexible joints are 4 ft. 6½ in. long. These dimensions with the

flanges that encircle the ball, thereby separating the ball end from the socket end. The ball end was then riveted to one pipe, and the socket to the next. When the riveting was completed, the parts were placed in position with the ball lifted off the bottom to aid in adjusting the socket. Divers fastened the flanges together again as soon as the socket was placed in position. The 60-in. pipe began with a flexible joint. As the lengths of pipe were laid, the forward end of each was raised by blocks, so that when from five to fifteen sections had been rigidly riveted, their weight caused them to sink to the proper grade—the joint permitting this motion. When this occurred another flexible joint was used, thereby taking the leverage off the preceding pipes, and preventing further settlement.

#### The Builder of the White House.

It was James Hoban—the friend of George Washington—to whose genius we owe the White House and other public buildings in the district, who was employed by the year, at the suggestion of President Washington in 1792, at an annual salary of 300 guineas, continuing until 1798, when he was appointed supervising architect of the United States Capitol, admittedly the building par excellence of the United States. James

\$55. Suppose it lasts but three years, we would have a cost of \$18.33 per annum for good paint and \$20 per annum for cheap paint.

This illustration shows, therefore, that durability is the main factor in the paint, especially as the principal motive of painting is to preserve the material over which the pigment was spread. What, therefore, becomes the main safeguard for that all-important quality, durability? To all practical men the natural answer will come: The use of that article which thus far has proved itself most effective in battling against the elements—pure linseed oil. That is the life of a paint, and it cannot be supplanted by fish oil, resin oil, emulsions, soap mixtures and the like. Therefore ask your manufacturers to guarantee beyond a shadow of doubt that the vehicle-employed in their house paints is "linseed oil, pure, simple and unadulterated."

#### World's Fair Notes.

It is the intention of the Indian Bureau of the United States government to make a complete Indian exhibit, occupying perhaps two acres. Representatives of all the leading tribes, especially those of a distinctive type, will be shown, together with their habitations, industries, etc. The Navajos will show their wonderful skill



#### A RESIDENCE AT ROCHESTER, N. Y.

4 feet pipes are 55 ft. 2 in. and 4 ft. 6 in. respectively. The steel used is ¾ inch single riveted Scotch boiler plate. The flexible joints have a body of the same material as the pipes, with a cast iron ball riveted on. A curved rim is riveted inside the socket, and filled with soft pig lead, which projects ½ inch beyond the rim, and works on the planed surface of the ball.

In the total length of the 48-in. pipe, there were 65 of these flexible joints used, on account of the irregularity of the bottom of the harbor through which they extended. In places rock had to be blasted and dredged to a depth of 8 ft. in order to conform to the proper grade and to give a depth of 14 ft. of water over the pipe to satisfy the requirements of the Harbor Commissioners. In the 6,027 ft. of 60-in. pipe, only 15 joints were considered necessary, as the trench dredged was in soft clay or sand, and could therefore be kept comparatively level. The 48-in. joints were riveted directly to the pipes. Where they were unnecessary, there was a steel sleeve riveted on, joining the two sections, and making a total length of one pipe of about 120 ft. The connections of the 60-in. pipes and joints were made by means of cast iron flanges having a faced projection of ¼ in. Inside this was a ¾-in. pipe packing, which was held in position by the faced projection on the inside and bolts on the outside; being first laced against one flange with wire.

The majority of the bolted joints were made under water by divers after the pipe was nearly in its final position. The 48-in. joints, before being riveted to the pipes, were taken apart in the center, by unbolting the

Hoban, born in Kilkenny County, Ireland, taught the profession of an architect in Dublin and was awarded a medal by the Dublin Society. In 1780 he left Ireland for Charleston, where he first settled. When Washington City was contemplated, Henry Laurens, of South Carolina, long a State captive in the Tower of London, gave Hoban a letter of recommendation to George Washington. After filling various high political positions, Hoban died in 1831, leaving considerable property to his children.

#### What Constitutes the Best Paint.

In a paper recently read before the Northwestern Railroad Club by Mr. J. P. Seymour, some useful hints are given which users of paint will regard with profit to themselves.

The paint that for the longest time will put off the necessity of repainting is the paint which must in the nature of things commend itself to the user as the most economical, which fact before a body of men like the Northwest Railroad Club is best illustrated by this calculation. Suppose a small depot along the line requires 20 gallons of paint. If the material selected for this work was cheap, 75 cts. per gallon, the cost would be \$15; cost of application, \$25; making a total cost of \$40. Such a paint would last at most two years, or a cost of \$20 per year for this station. Now suppose this material selected for this station was the best paint. Twenty gallons would cost, at \$1.50 per gallon, \$30; the cost of application the same as that of the cheap material, \$25; making a total cost for the best paint of

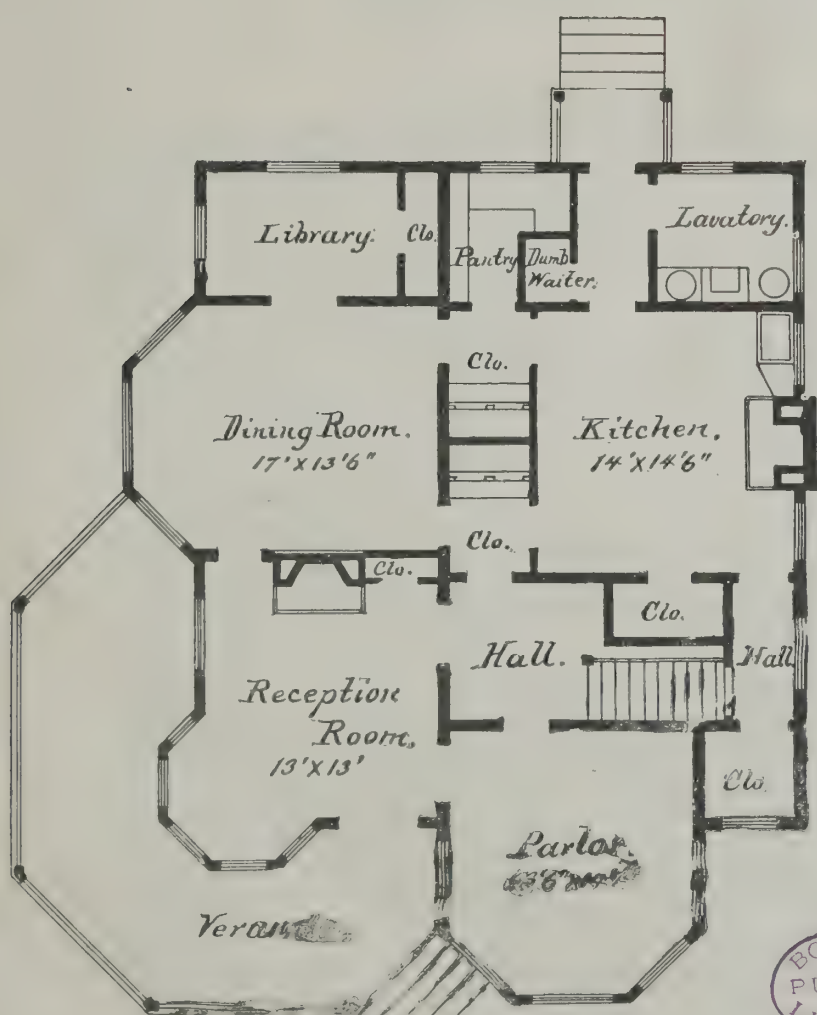
in blanket weaving, the Zunis, whose customs have been a study for years, will make pottery and live in a "hogan," as they call their peculiar residences, the Piutes are to make water bottles of rushes. Then there will be a great collection of relics, weapons, and utensils. There will also be in operation a model Indian school under competent teachers. The wild be-painted and be-feathered aborigine will be contrasted with the civilized or semi-civilized Indian of to-day. It is believed that foreigners particularly will be interested in the Indian exhibit.

The Patent Office will exhibit a comprehensive array of models to illustrate the wonderful progress of mechanical civilization. One group of models will show the progress of the printer's art from Gutenberg's crude invention to the latest rotary perfecting and folding printing press, capable of turning out newspapers at the rate of many thousands per hour. Other groups will show the development of the steam engine, sewing machine, agricultural machinery, application of electricity, etc.

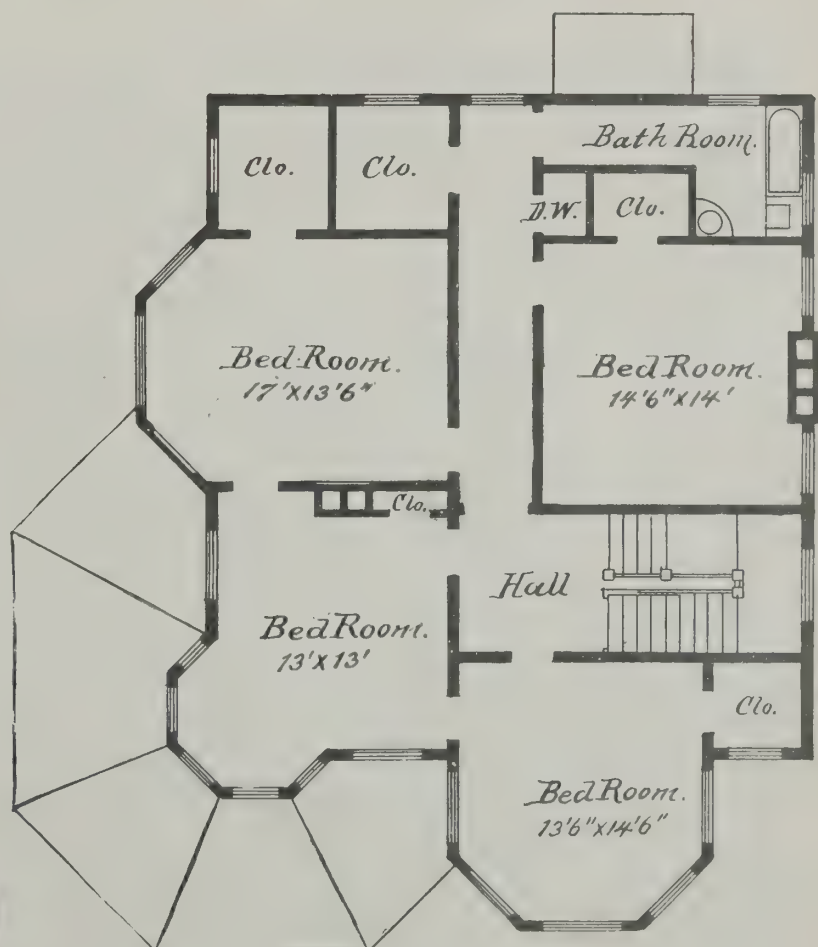
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First Floor Plan.



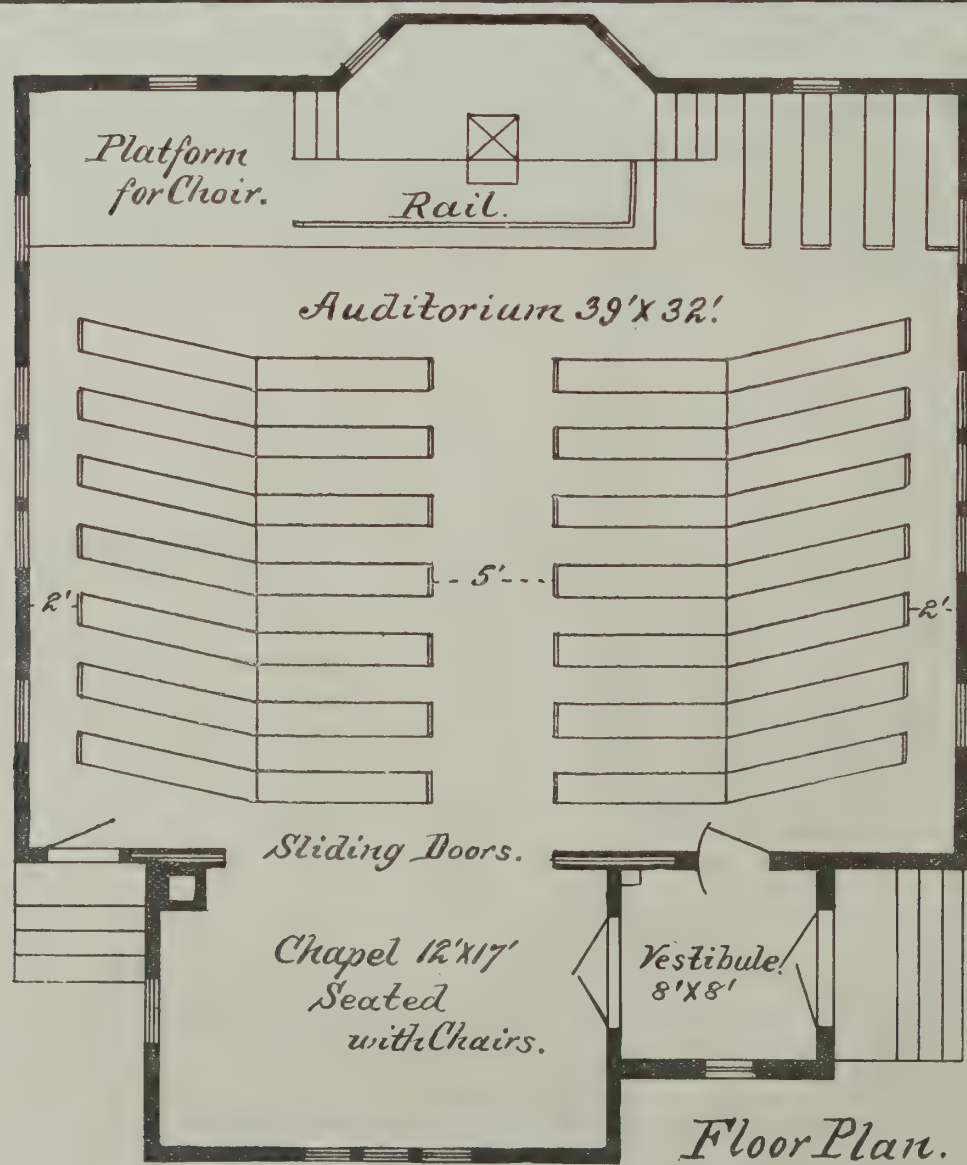
Second Floor Plan.



[See page 8.]

A RESIDENCE AT BRIDGEPORT, CONN.





A CHURCH OF MODERATE COST.—[See page 8.]



**A HEAVY TWELVE-INCH STANDARD MOULDER.**

The illustration represents a very heavy four-sided moulder designed for large work. It is especially adapted for all kinds of heavy building material, car work, mantel work, etc. The side heads, with their spindles, raise and lower with the table, and both inside and outside spindles are adjustable vertically and horizontally, while in operation, by hand wheels on the front side below the bed. The under head is also adjustable laterally. These are great improvements on moulders, and will be appreciated by all first-class operators. There are chip breakers to every head, and in this there is a marked advantage, as there can be no tearing on any of the heads, the way these improvements are rigged. The feed is extra powerful, and consists of

gestions in this line may, therefore, find something to their taste in the accompanying illustration, which is an original design specially made for the Willer Manufacturing Co., of Milwaukee, Wis., and appearing in their catalogue, No. 9. This company has made a specialty of fine interior hard-wood woodwork for first class buildings, and has finished the halls and staircases complete of many beautiful residences.

**Hot Water vs. Steam Heating.**

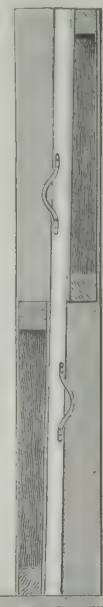
An interesting essay under this title, written by Leicester Allen, M.E., has recently been issued by the Sanitary Publishing Company, of New York, and is mailed to any address for the price of ten cents. The author has had an extensive practical experience

brick suitable for pavers, its testing, laying, cost, and advantages, list of cities using such pavement, etc. It is said that the use of brick for paving is no longer an experiment, Decatur, Illinois, one of the first cities to use brick for this purpose, having now about ten miles of brick-paved streets, which it is said are giving great satisfaction. Brick for this purpose is made of such density as to be practically impervious to water, and should be very tough and thoroughly vitrified.

**SCHMIDT'S IMPROVED WINDOW FRAME.**

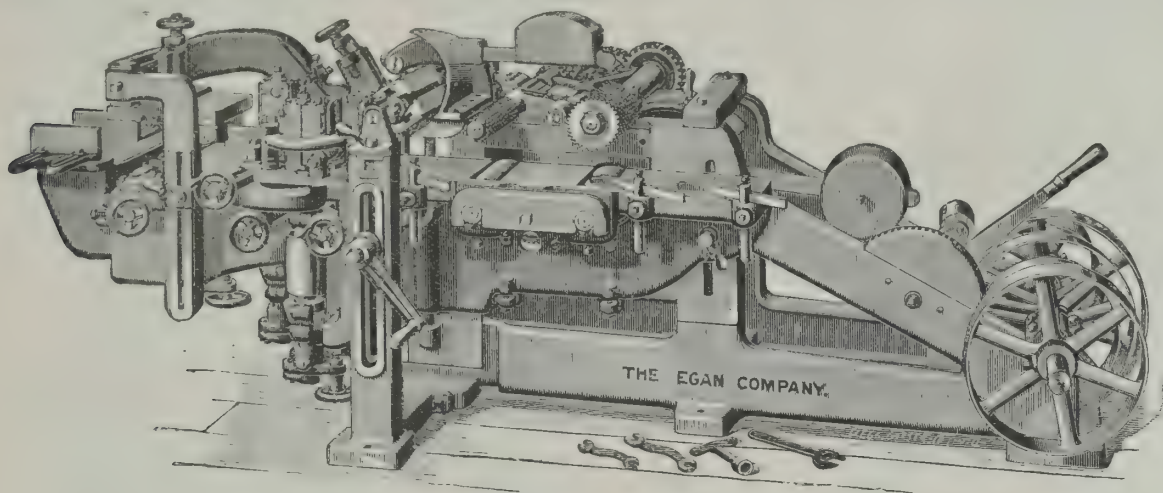
This patented improvement was illustrated and described in our last issue, but an incorrect worded sentence rendered the description somewhat erroneous, although the illustration plainly represented the efficiency and simplicity of the device.

The parting rail in the slideways, as shown in the accompanying picture, is placed in a slightly diagonal position, so that when the sashes are closed they will be firmly wedged in position to exclude air and prevent rattling, while in the upper portion of the slideway of the lower sash and the lower portion of the slideway of the upper sash a spring is placed in a recess in the parting rail, by means of which, when either sash is pushed to the wider portion of its slideway, it will be held at any position in which it may be left. The obvious convenience and the extreme simplicity of the device will be readily apparent. The improvement has been patented by Mr. August Schmidt, of No. 1768 Amsterdam Avenue, New York City.

**Value of Thoroughness.**

Accuracy in details is the one thing lacking with many mechanics as well as business men. They perform their tasks in a perfunctory way and are satisfied with general results. Thoroughness is one of the greatest needs of this superficial age. Everything is done in a hurry and every one seems possessed with the idea of covering the most ground in the shortest time. Work is estimated by its surface measurement rather than by breadth and depth. The tendency is a mischievous one and should be guarded against. The man who masters the details of his profession builds upon a foundation that will withstand the severest tests of time and circumstances.

THE WESTERN MINERAL WOOL Co., recently removed to the "Rookery" building, Chicago, announce the erection of an extensive plant, to be completed January 1. The company has very extensive facilities for the manufacture of insulation, deafening, fire-proofing, pipe and boiler covering, and asbestos materials, and is prepared to submit estimates or make contracts for the largest possible undertakings.

**THE EGAN COMPANY HEAVY STANDARD MOULDER.**

four rolls, two in the bed and two above, all driven by powerful gearing, and the expansion for driving the lower rolls is very perfect. There are two feeds on the machine. The upper feed spindles are hung on links in such a manner that the feed rolls raise up parallel, giving the feed rolls a full bearing on the board the entire width of the piece. By an improved system of weighting, the feed rolls can be instantly raised up, allowing the operator to slip the board back. For further information address the builders, the Egan Co., Nos. 209 to 229 West Front Street, Cincinnati, Ohio, U. S. A.

**A STAIRCASE AND HALL DESIGN.**

A house built for a particular individual or family may vary in many particulars from the regular and conventional styles on which builders plan groups of houses to put on the market without any addition to the cost. And all such variations, provided they be in good taste and made with a proper sense of harmony and proportion, add greatly to the charm of a home. Perhaps in no other one particular is there so great an opportunity for specialization in the construction of a house as in the planning and arrangement of the main hall and staircase. Those who are looking for sug-

with all the leading systems of heating, and is able also to explain all the details from a thoroughly scientific standpoint. He does not believe in poor work of any kind, or in an incomplete or ill regulated service, but emphatically indorses hot water heating, and the employment of such heaters as are made on the drop tube system, as having greater durability and best promoting an efficient circulation. The pamphlet has a number of illustrations of successful applications of hot water heating.

MESSRS. LANE BROS. of Poughkeepsie, N. Y., report that their business never was better than it is at present. The "Lane Barn Door Hangers," as well as their parlor door hanger, are now well known in all sections of the country, and the sales are said to be constantly increasing. A recent addition to the works of the firm has just been completed.

"BRICK PAVEMENTS" is the title of a most interesting book of seventy-five pages prepared by Messrs. J. W. Penfield & Son, of Willoughby, Ohio, for the use of their customers and others interested. The firm are manufacturers of a large variety of clay-working machinery, and in this book they treat of the kind of

**A STAIRCASE AND HALL DESIGN OF THE WILLER MANUFACTURING CO.**

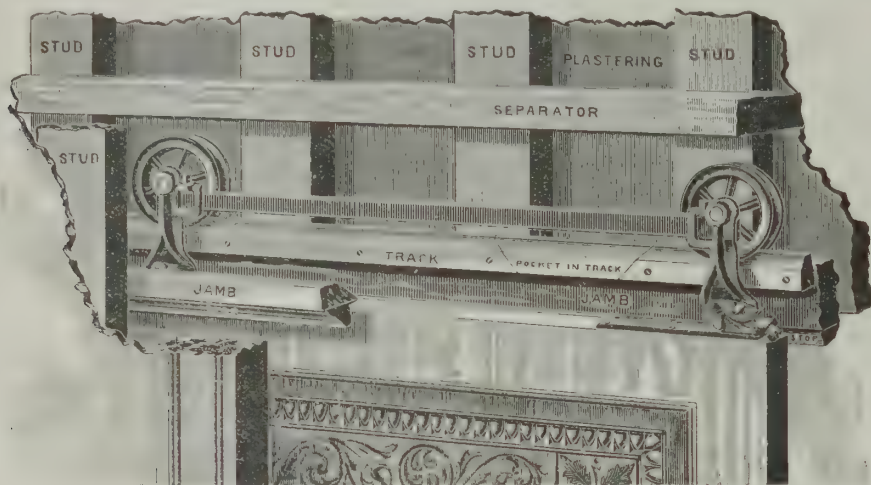


## THE IMPROVED WARNER DOOR HANGER.

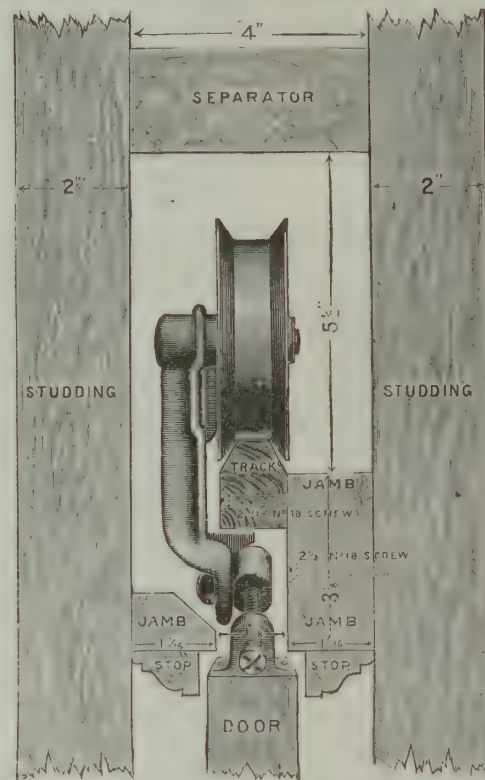
The new single track parlor door hanger shown in the accompanying illustrations is designed to be very simple in its construction, and in the method of putting up. It is manufactured by Messrs. E. C. Stearns & Co., of Syracuse, N. Y., and to avoid noise, while still giving strength and durability, metal wheels are used and well seasoned hard wood track. The wheels are  $3\frac{1}{2}$  in. in diameter, and the bearings are lined with anti-friction metal. The axles are  $\frac{7}{8}$  in. round steel, carefully turned, supported in upright frames of novel form to insure the perfect centering of the door when suspended. The base plates are attached to the top of the door, without cutting or mortising, and the nuts attaching the adjusting screw to the frame are so made as to accommodate themselves to any desired vertical adjustment of the door. The adjusting screws are placed at the upper corner of the door, where the adjustment can be most conveniently effected. This new

96 inches, or, in other words, the distance between column and saw is 48 inches. The frame is cast in one massive piece, with a rectangular cored section, so that it is capable of withstanding a strain equivalent to one and a half tons on the wheels' axis, without affecting the saw guides. The wheels are 48 inches in diameter and have a  $3\frac{1}{2}$  inch face. The shafts which support the wheels are of unusual diameter and length. The upper wheel shaft is  $2\frac{1}{2}$  inches in diameter and revolves in two boxes with a total bearing surface of 12 inches. The lower wheel shaft is 3 inches in diameter and revolves in two boxes with a total bearing surface of 18 inches. The iron table is large and heavy, and in proportion to the machine. It pivots in a semicircular bearing, and can be adjusted to any angle in a moment's time and held rigidly in position by a new and patented device.

The graduated friction feed works are mounted on a swinging frame hinged to column, and consist of four



THE WARNER DOOR HANGER—SIDE VIEW.



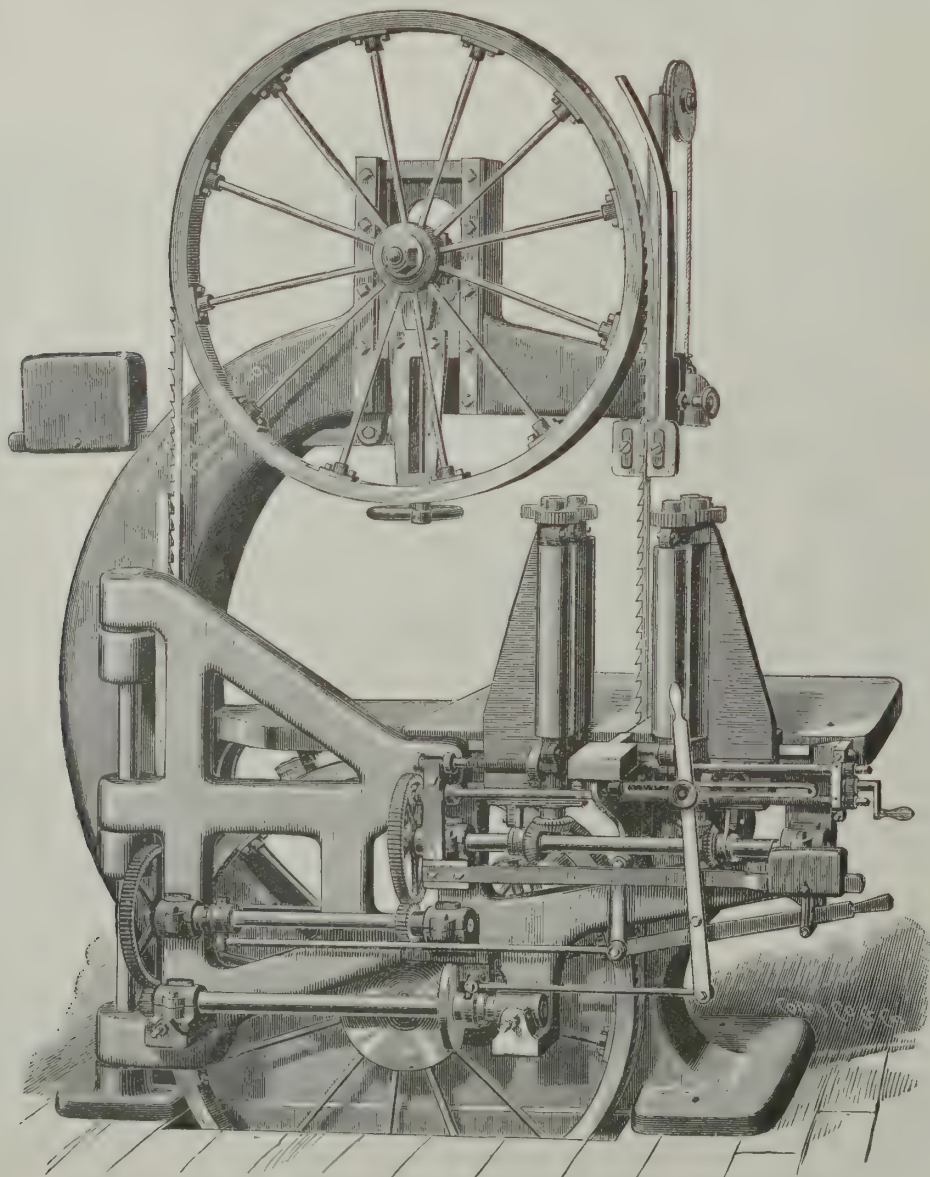
THE WARNER DOOR HANGER—END VIEW.

hanger gives a perfect alignment. There is no mortising or cutting of studding, no rivets are used, all the main parts being solid, and no boxing is required.

## AN IMPROVED BAND SCROLL AND RESAW.

The engraving shows an improved patent band sawing machine, for scroll work and resawing, designed principally for heavy work, such as is required in ship building, car, carriage, wagon, and agricultural implement works. It can also be used to great advantage in furniture and organ factories, planing mills, etc. This machine will carry a saw  $\frac{1}{4}$  inch wide as well as it will a saw  $2\frac{1}{2}$  or 3 inches wide. Consequently it will answer for light as well as heavy work. It will take in 24 inches under the guide, and will saw to the center of

4 inch (power driven) strongly geared feed rolls, controlled by hand levers placed at side of machine where the operator stands, and the speed of feed can be varied from nothing up to 30 feet per minute. The rolls are self-centering and will center a board or timber of any thickness up to 10 inches thick and 24 inches wide; one side of the double feed rolls can be made stationary, while the other side yields, thus enabling the operator to cut a slab  $\frac{1}{4}$  or  $\frac{1}{2}$  inch thick off a board of any thickness up to 5 inches. Two blades are furnished with each machine, one blade 3 inches wide for splitting, the other  $\frac{1}{2}$  inch wide for scroll work. The tight and loose pulleys are 24 inches in diameter by  $6\frac{1}{4}$  inch face, and should make 400 revolutions per minute. For further particulars about this



THE CORDESMAN MACHINE CO.'S NO. 4 BAND SCROLL AND RESAW.

## Artificial Stone.

Ten parts of silicic acid, powdered and freed from impurities, are mixed with 90 parts of water and 100 of quicklime, all by weight. One hundred parts of the product are mixed with 100 parts of sand and 5 parts of magnesia or fluorspar, and the mass moulded as desired. The articles are allowed to dry for 12 to 24 hours, and subjected to steam pressure under 10 atmospheres pressure for 48 to 72 hours, after which they are treated with boiling saturated calcium chloride solution at a pressure of 10 atmospheres for 6 to 12 hours. They may then be dried by air or the circulation of steam. Marble, magnesia, magnesium limestone, etc., may be substituted for the sand. The stones thus formed are said to resemble marble, sandstone, granite, etc., closely, to be fireproof, and to resist the action of the weather as well as natural stones.—C. George, Berlin, Germany.

## AN IMPROVED FLOUR BIN AND SIEVE.

The receptacle for flour shown in the illustration is designed to be also an aerator and sifter, having a reel inside the bin to agitate the flour and make it light, thereby improving its quality, and preventing mould or mustiness. It can be kept on a pantry table or shelf, and by its use flour enough for a baking can be sifted in a moment, without the employment of the extra scoops, sieves and other receptacles generally required.



It is made in sizes to hold 25, 50, and 100 pounds, by Messrs. Sherman & Butler, 26 and 28 West Lake Street, B, Chicago, Ill.

THE HARTMAN MFG. Co., of Beaver Falls, Pa., publishes a neat booklet with illustrations and testimonials of their goods, which they will take pleasure in sending to parties interested. The line of goods includes steel picket lawn fence and gates, wire panel farm fence, steel picket tree and flower guards, flexible steel wire mats, woven wire carpet. The company is admirably equipped to afford the best goods at reasonable prices.





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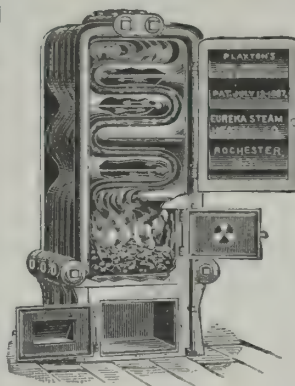
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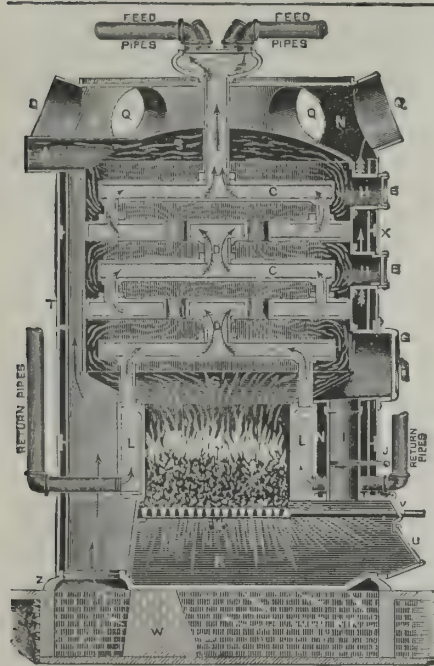
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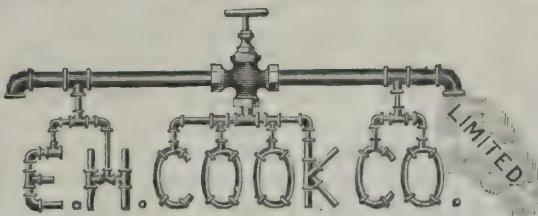
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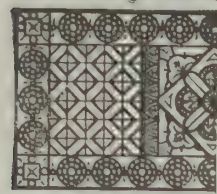
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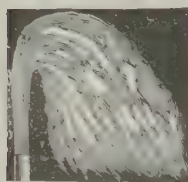
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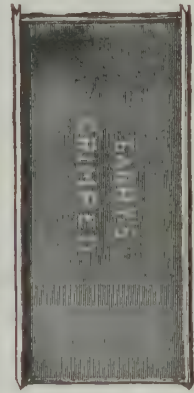
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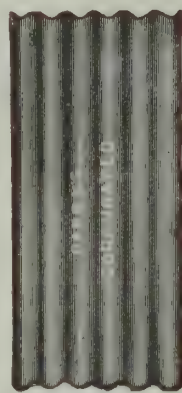


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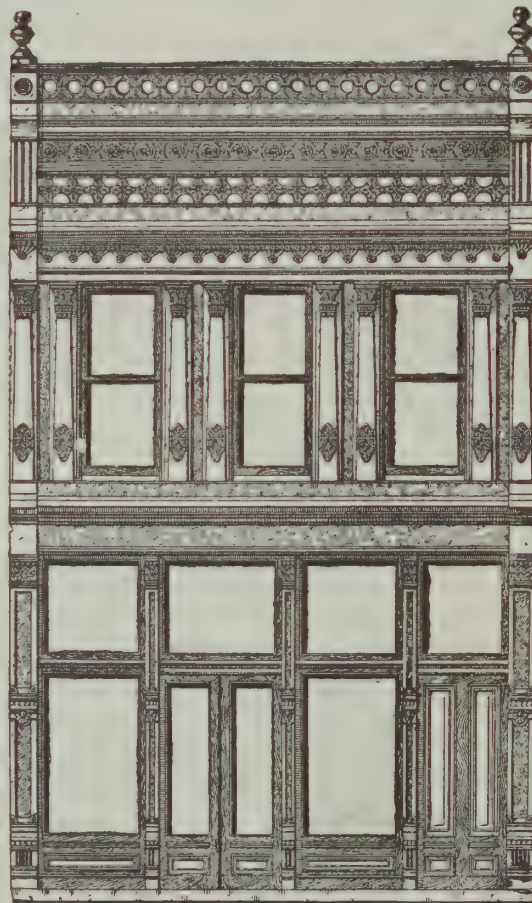
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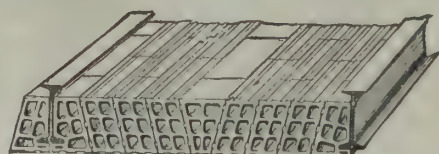
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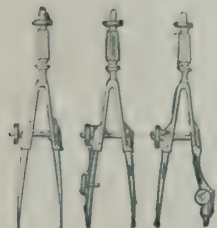
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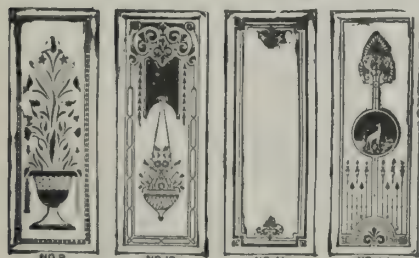
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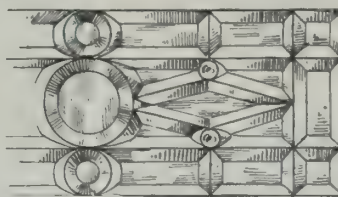
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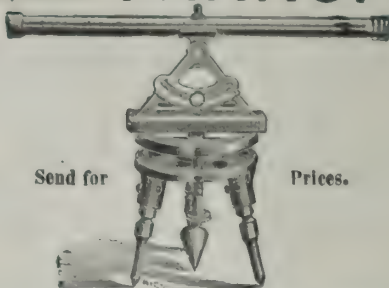
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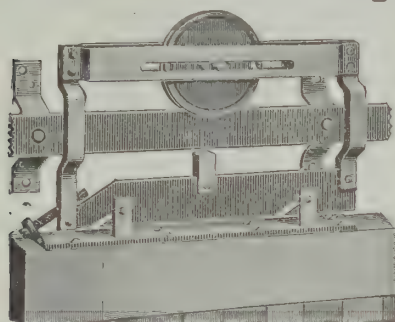
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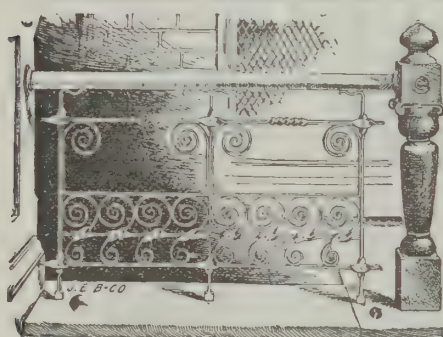
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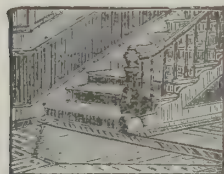


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(Continued on page vi.)

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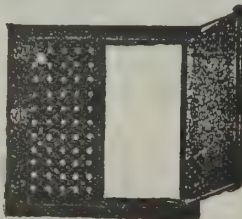
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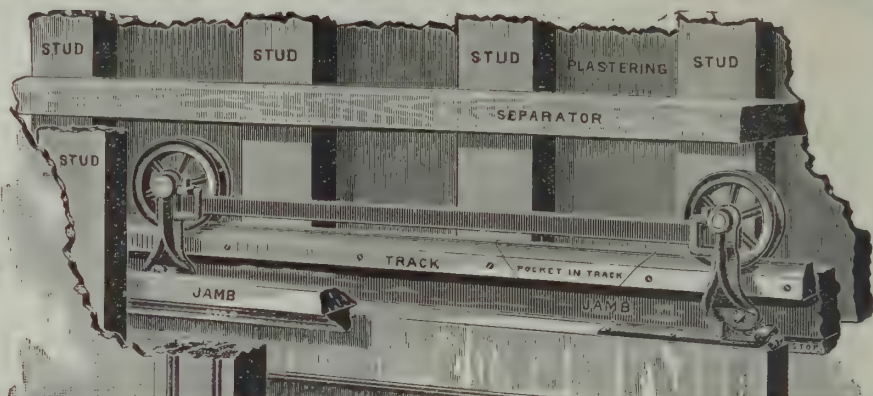
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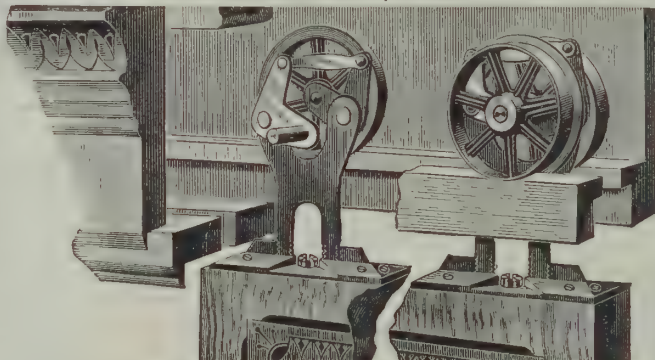
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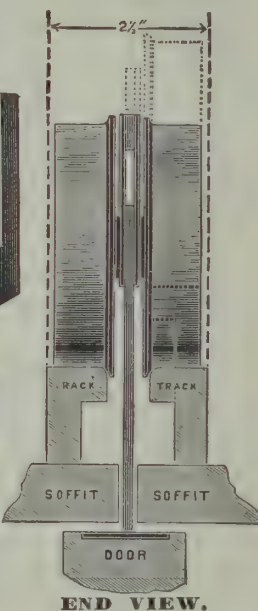
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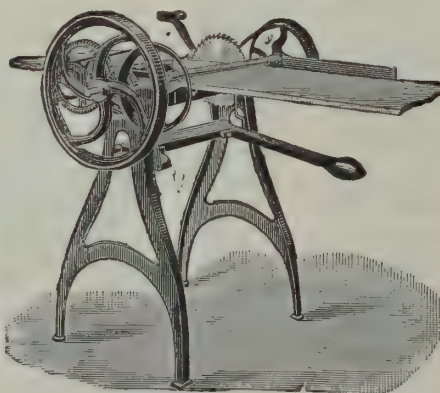


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(Continued from page iv.)

(6) E. W. R. writes: Have you any receipt for killing a small fly insect or borer which works in oak lumber, both in piles and in buildings, where there is not much to disturb them? This fly is very small, light brown in color, and between one sixteenth and one thirty-sixth of an inch in diameter and one-eighth of an inch long. It bores very rapidly, and works in our oak flooring, posts and girders, and in the board floors of our warehouse, where there is not much walking and going to disturb them. They will not work in the floor where we are running trucks or walking through it. We have written to a large number of lumbermen, but they know of nothing absolutely practicable for destroying the insects. A great many had heard of them, but had had no experience with them. We have saturated the lumber with strong solutions of salt brine, both hot and cold, and have also limed the posts and girders. It may be that we kill off a great many of the living insects, but if so, we do not kill the eggs, and the insect seems to increase with remarkable rapidity. A Reply by Prof. C. V. Riley.—The small fly insect or borer which works in oak lumber, as described in your letter, is a common and widely distributed pest bearing the scientific name of *Lyctus striatus*, Melsh. It is properly not a fly but a small beetle belonging to the family Ptilinidae. The department is frequently in receipt of letters relating to damage by this insect. It is rather a difficult insect to control, and the remedy I have formerly advised, and which is the only one which seems to promise success, is to paint or coat the timbers, buildings, or stored lumber with kerosene. The insect works near the surface of the wood, and the kerosene will penetrate sufficiently to kill the beetles and early stages. Benzine or gasoline may be used in lieu of kerosene if the latter is objectionable for any reason, but these substances will not be so effective on account of their more rapid vaporization.

(7) P. F. S. says: Kindly inform us what dimensions you would recommend for a round chimney to get the best efficiency from a 2,500 horse power steam plant, tubular boilers. The location of the proposed chimney is fairly good. While not situated upon a hill, it is not a valley, nor is it surrounded by buildings. A. The size and height of a chimney for so large a power should be computed from an assumed consumption of coal per horse power, which will depend very much upon the kind of engines and capacities of boilers for economy of steam production. If an assumed consumption of 2 pounds coal per horse power is used, your chimney should be not less than 8 feet diameter (round) and 150 high.

(8) J. M. asks the different speeds a wood-turning lathe ought to run to turn the following work: a column 8 in. diameter, a wheel 3 ft. diameter and a small job 1 in. diameter. A. Base all calculations on a peripheral speed of 500 ft. per minute. This is as much as the tool will stand. For the three cases cited this would give speeds of 240, 55, and 1,920 revolutions per minute approximately.

(Continued on page vii.)

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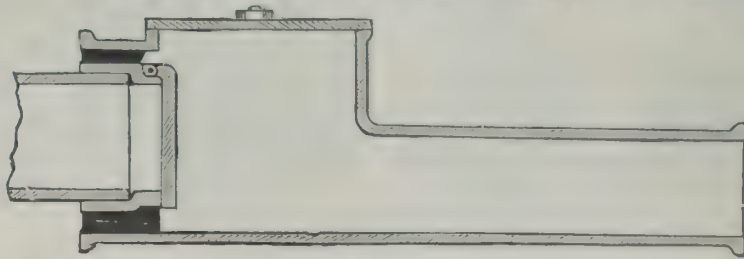
(Continued from page vi.)

(9) C. F. L. asks: Can you inform me how to get rid of house sand fleas? The house is new, was occupied about six months and has now stood vacant four or five months. I am told they are in the plaster. A. Carbolic acid one part, water 20 parts; sprinkle the premises thoroughly with this.

(10) B. F. G. writes: I have some porcelain wash basins, and I want to drill two half-inch holes in the sides of them. Can you inform me through your valuable paper the easiest way I can drill them? A. You can readily drill holes in the basin by using a common drill hardened in a strong solution of chloride of zinc. The drill should be made of new steel, and should be heated to a low red before being cooled in the chloride of zinc. See the "Cyclopedia of Receipts."

(11) S. R. T. says: Suppose a lead pipe 2 inches in diameter, laid from a spring, descends 19 feet into a ravine, then up 32 feet to the top of a ridge, thence down 70 feet to the base of a building three stories high. Can this pipe be made to siphon the water and raise it to the top of the building, 32 feet high? If so, what is the best way to fill the siphon. By a pump at the spring or an air pump at the house? What is the limit of useful employment of siphons this way? What is a good practical work on this class of subjects, and do you furnish it, and the price? I should have mentioned that the pipe will be a half mile long. A. The pipe can be made to siphon the water to the house, and should flow about 18 gallons per minute at top of house, if free from air. Place the air pump at the house for convenience. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 793, on siphons. The principle of siphonage is perfectly practicable wherever desirable within the limit of atmospheric pressure as applicable to pump suction, say 25 feet lift, and any height required in an invert siphon. In this way the siphon has been largely used in the United States for water supply. There are no books on this subject.

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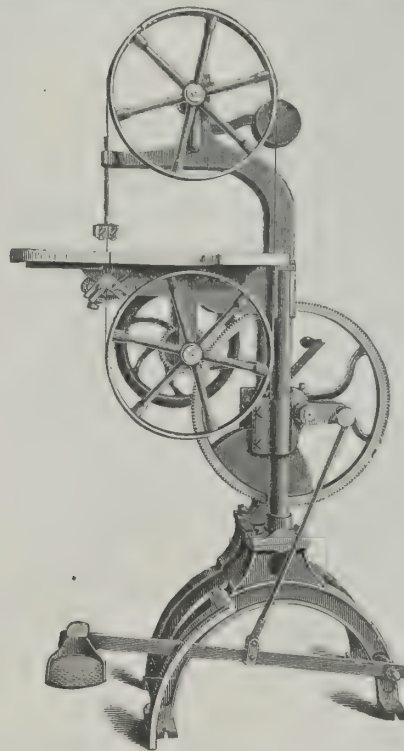


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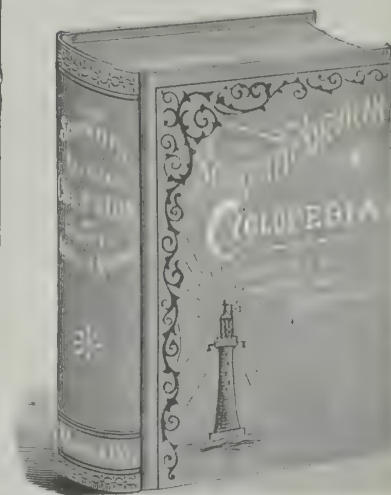
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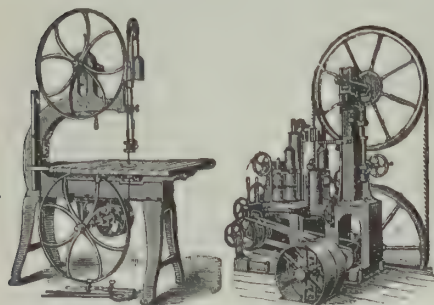
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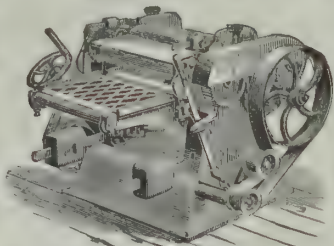
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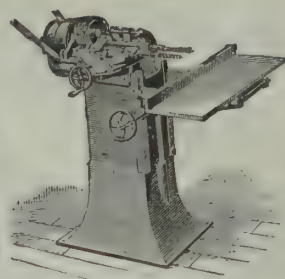
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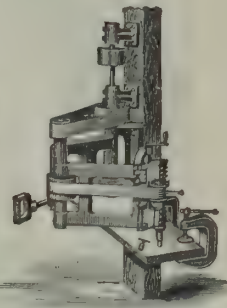
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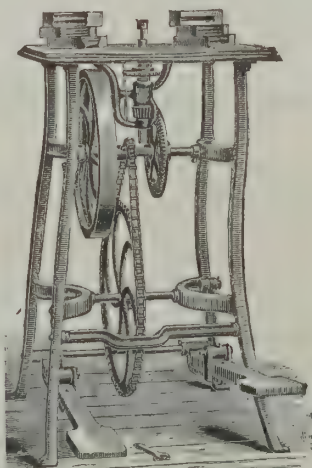


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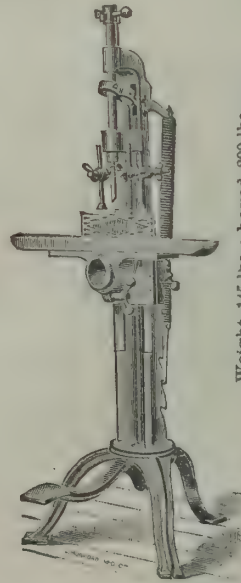
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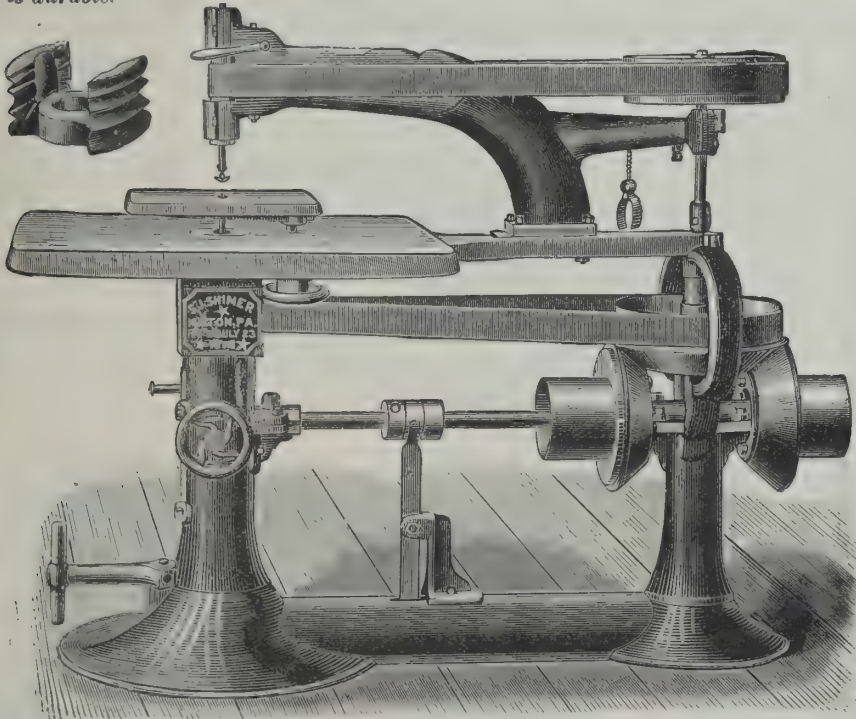
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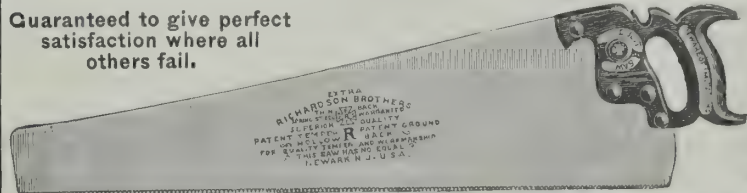
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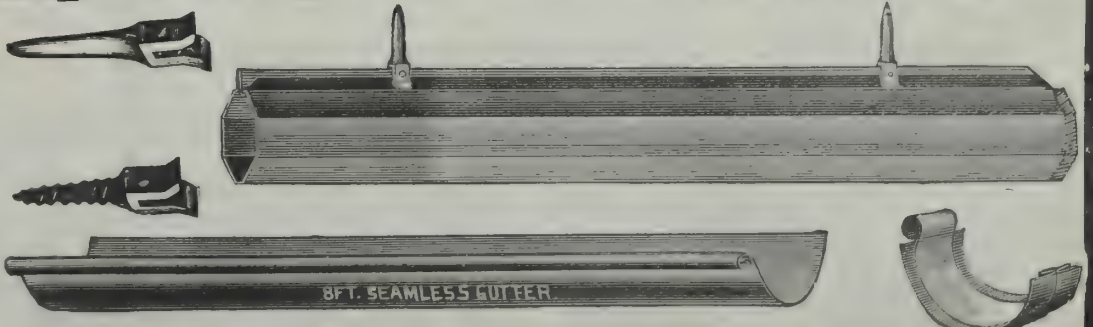
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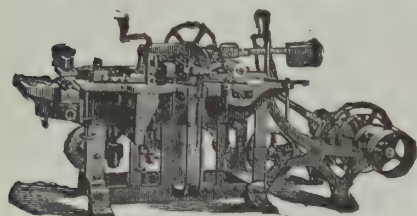
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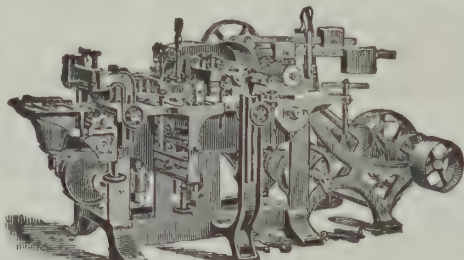


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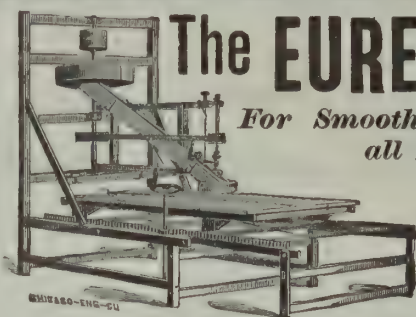
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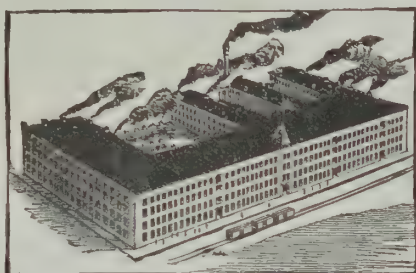
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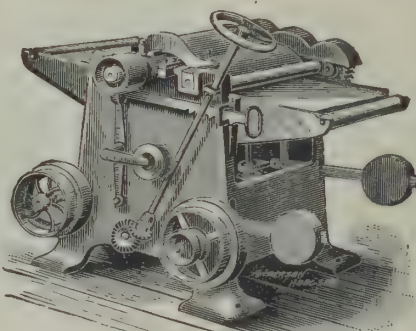
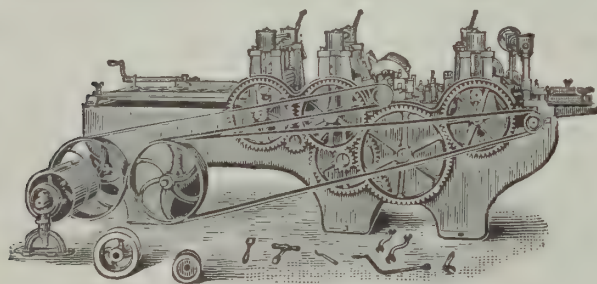
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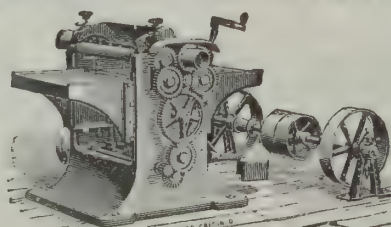
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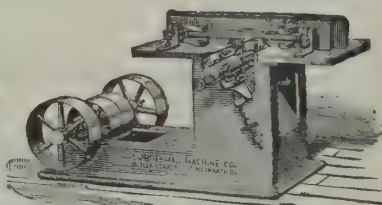
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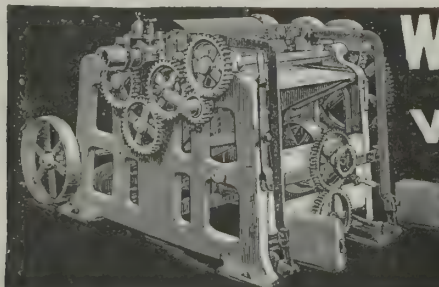
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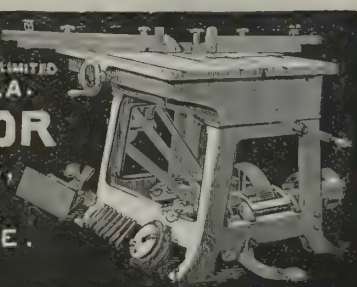
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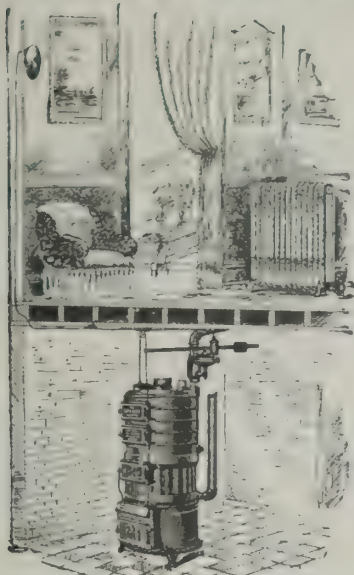
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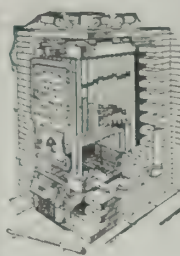
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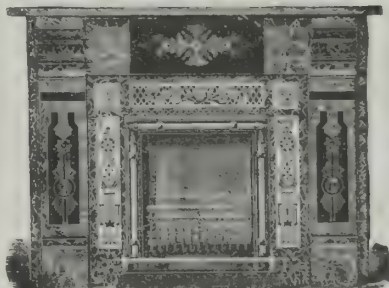
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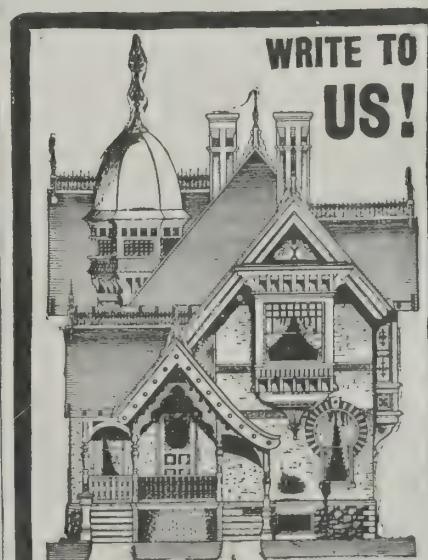
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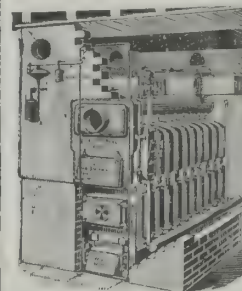
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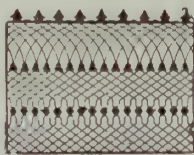
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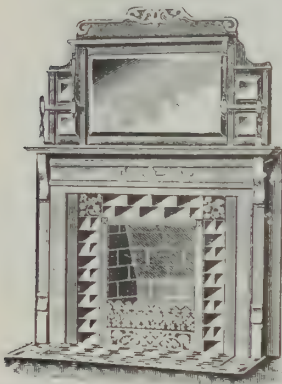


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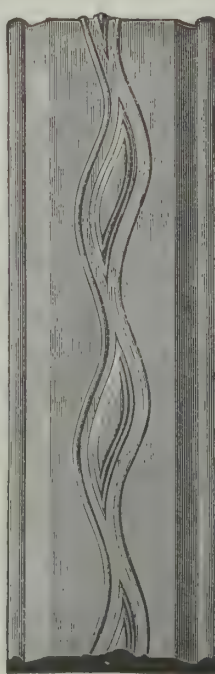
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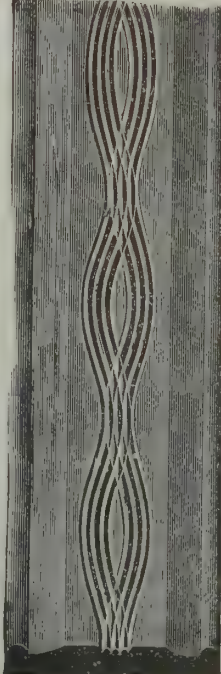
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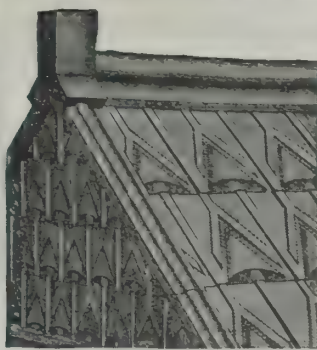
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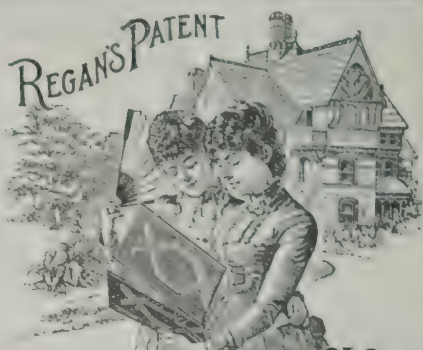
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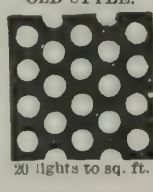
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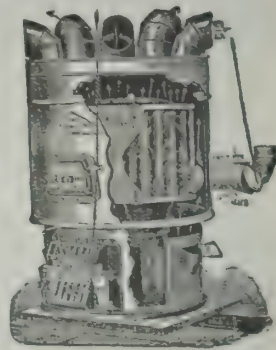




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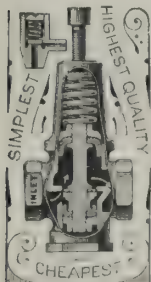
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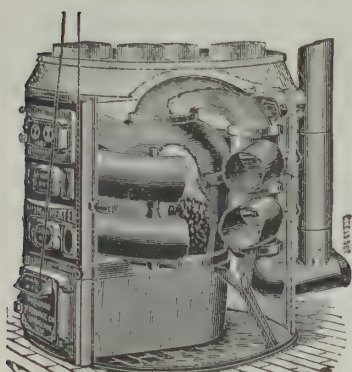
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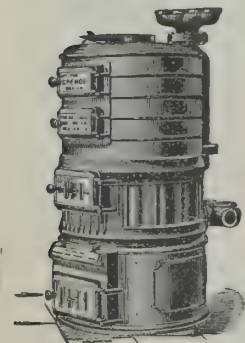
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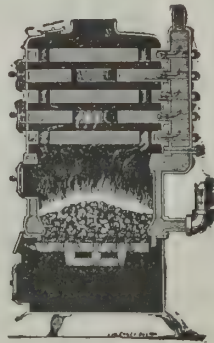
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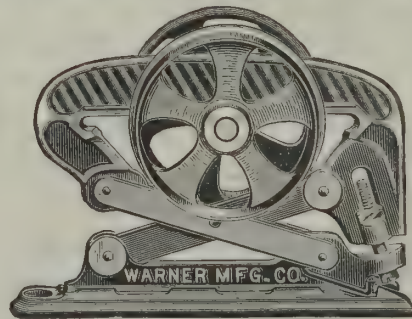
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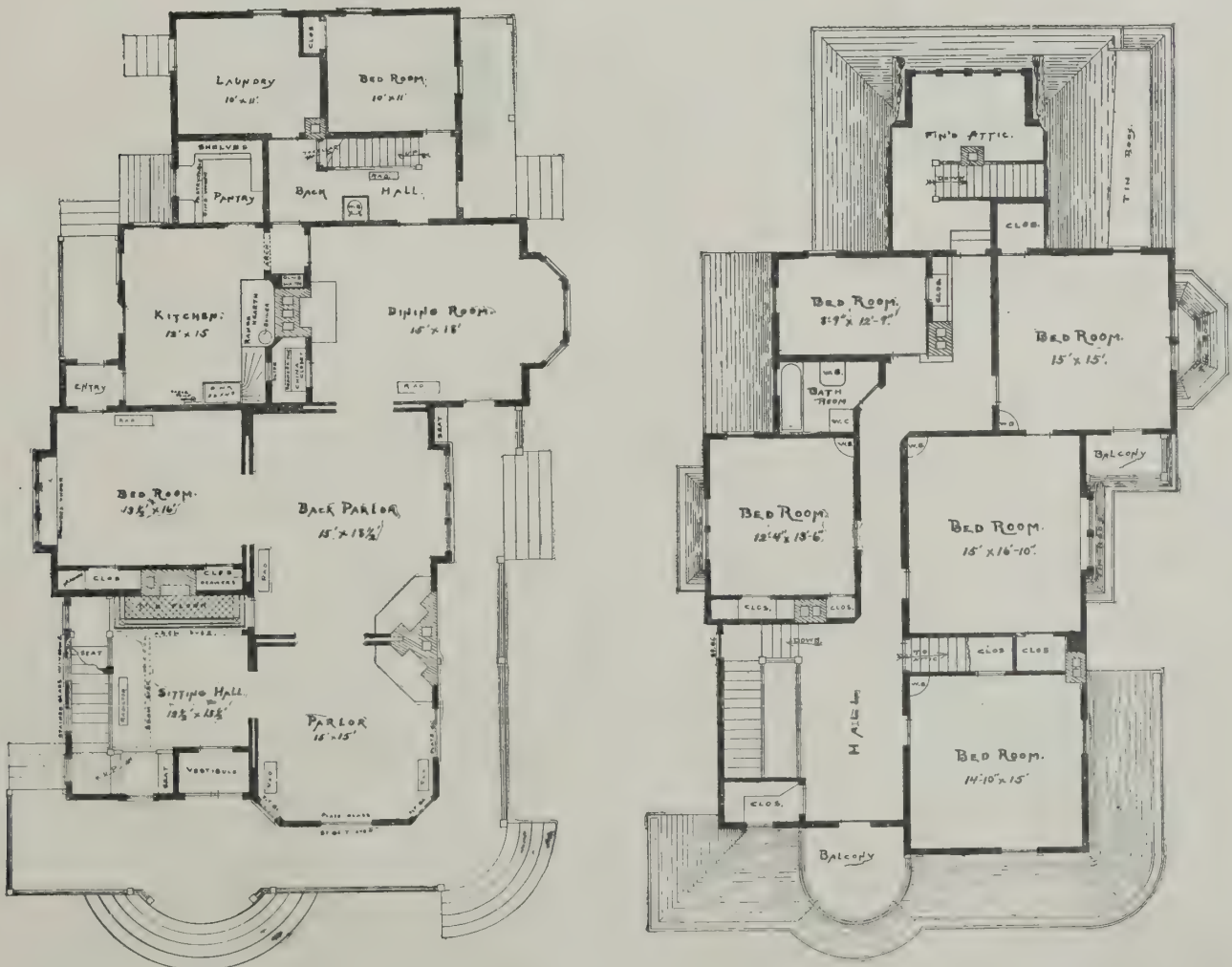


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A RESIDENCE AT CARTHAGE, ILL.

[See page 19.]





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THE

## Scientific American,

ARCHITECTS AND BUILDERS EDITION.

\$2.50 a Year. Single Copies, 25 cents.

This is a Special Edition of THE SCIENTIFIC AMERICAN, issued monthly. Each number contains about forty large quarto pages, forming, practically, a large and splendid Magazine of Architecture, richly adorned with *elegant plates in colors* and with fine engravings; illustrating the most interesting examples of modern Architectural Construction and allied subjects.

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### A COTTAGE AT SHORT HILLS, N. J.

One of our colored plates this month illustrates the above cottage in perspective and gives floor plans. The parlor is 14 ft. x 16 ft., entered directly from the main hall, well lighted with two spacious windows, the central one being in the form of a bay. The library is 16 ft. x 17 ft., has a central fireplace, with two closets, one on either side. The dining room is 12 ft. x 15 ft., and directly connected with the kitchen. The kitchen is fitted up with a sink, ample closet room and pantry. On the second story are four bed rooms, amply supplied with closets, and a toilet room, with towel closet. The first and basement story are built of stone 20 in. thick. The second story is built of frame and covered with shingles. The grounds are artistically laid out, and have a happy effect as a whole. The estimated cost of this cottage was \$5,000, and it is owned by Mr. Hartshorn.

Our plate was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

### A COTTAGE IN MAINE—COST, \$900.

We present as the subject of one of our colored plates in this issue a dwelling erected for Dr. C. M. Talbot, at Great Diamond Island, Maine. Dimensions: Front, 28 ft. 6 in.; side, 41 ft., exclusive of piazza. Height of first story ceiling, 9 ft.; second, 8 ft. Underpinning, brick on stone footings. The exterior framework is sheathed and the first story is clapboarded and painted light olive green, with bottle green trimmings; second story, shingled and painted red. Roof shingled. The design is of the Queen Anne style, and it is provided with a wide piazza across the front and side. The interior throughout is trimmed with white pine, finished natural. The walls, ceilings and partitions are ceiled with narrow beaded stuff. The living room, good sized, is provided with an open fireplace, built of brick, with hearth laid with same, and finished with a neat wood mantel. The staircase is separated from the living room by a column extending to ceiling, the space between being filled in with spindle work. Kitchen is provided with sink and pantry complete. The shed provides ample room for the storage of wood, coal, etc. There are four bed rooms and loggia on second floor. The floors are of yellow pine, laid in narrow widths. Cost, \$900 complete. Mr. Antoine Dortocos, architect, Portland, Maine.

Our plate was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

### A RESIDENCE AT PORTLAND, MAINE.

Our engraving, page 20, presents a residence erected for W. C. Davis, Esq., at Portland, Me., from plans prepared by John Calvin Stevens, same place. Dimensions: Front, 47 ft.; side 46 ft., not including front piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The walls are built of brick of a deep red. Roof is covered with a dark blue slate. Trimmings are painted a dark bottle green. Windows are glazed with plate glass, except the staircase window, which is glazed with stained glass. Hall is trimmed with mahogany and it is furnished with a parquet floor, paneled wainscoting, ribbed ceiling, arch with spindle transom and a staircase with carved newels. Parlor and library are trimmed with similar wood and are fitted up complete, with open fireplaces, furnished with tiled hearths and facings and elegant hard wood mantels. Dining room is trimmed with black walnut, and it has a paneled wainscoting four feet in height and colonial columns, and mantel piece extending to ceiling, which is divided with wooden ribs into panels. Kitchen and its apartments are trimmed and wainscoted with whitewood finished natural, and are fitted up in the best possible manner. The servants' hall and staircase are private from kitchen to attic. The second floor contains four bed rooms, large closets and bath room, all of which are trimmed with whitewood finished natural. Fireplaces are built of brick, with hearths laid with same. The bath room is wainscoted and fitted up with tub, bowl and closet complete. Three bed rooms and billiard room on third floor. Cemented cellar contains laundry, furnace, and other apartments. The cost is \$11,000, including plumbing, furnace, gas fixtures, grading, etc.; in fact, complete in every respect. Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

### A RESIDENCE AT PORTLAND, MAINE.

We present on page 21 a very attractive residence recently erected for E. T. Burrowes, Esq., on the Western Promenade, at Portland, Maine, from plans prepared by John Calvin Stevens, architect, same place. The underpinning is built of selected brick and the building above is of wood, with exterior clapboarded and painted a mellow brown, with trimmings of a darker shade. Gables are filled in with carved panels. Roof covered with red slates. Dimensions: Front, 43 ft.; side, 56 ft., exclusive of piazza and porch. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 10 ft.; second,

9 ft.; third, 8 ft. 6 in. The interior arrangement is excellent and the rooms are well located for light, convenience and comfort. Vestibule has a tiled floor. Hall is trimmed with antique oak. It has a paneled wainscoting five feet high, a ribbed ceiling, and it contains an ornamental staircase, with carved newels, which is lighted effectively with stained glass windows. A toilet is provided under this staircase. One of the most novel and attractive features is the arched effect in hall—the pilasters with carved capitals supporting arch. Floors are laid in oak and are highly polished. Parlor, spacious, is treated in a delicate manner with old ivory white, and is provided with an open fireplace, furnished with onyx tiles and a mantel of exquisite design. Library and dining room are trimmed with quartered oak, and each have fireplaces, with tiled hearths and old colonial carved mantels, with beveled plate mirrors. Library is provided with book cases built in, while the dining room has a paneled wainscoting and buffet. The rear hall and staircase are private from cellar to third floor (attic). The kitchen is isolated from the rest of house and is trimmed with ash, finished natural. It is provided with numerous pantries, well fitted up in the best improved manner. Second floor contains four bed rooms, den and bath room. These apartments are trimmed with whitewood and treated in colors. Each apartment is provided with a large closet and two of them have stationary wash bowls. Bath room is wainscoted with ash. Three large bed rooms and storage on third floor. Cemented cellar contains furnace, laundry and other necessary apartments. Cost, \$9,500 complete.

Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

### Architecture and Poetry.

At the recent meeting of the Western New York Chapter of the American Institute of Architecture, Rochester, N. Y., J. Harry Stedman responded as follows to the above toast:

Of the various vocations that absorb the human mind,  
The architect's profession is the most peculiar kind.  
An office and a shingle are essential things, no doubt,  
But several other factors help to round the practice out.

Mechanical ability a set of plans to make,  
Artistic sense to work them up so they are sure to take.  
Preliminary estimates at maximum, prepared,  
That will foot up so little that the client won't get scared.

Some knowledge of surveying, that he may lay out the land,  
The lines and grades electing where the edifice shall stand.  
In "ancient lights" and "real estate" he must be quite at ease,  
Not to mention landscape gardening, sidewalks, sewers, shrubs and trees.

Then he must cope with coping and everything discussed,  
And know much more of fencing than how an arch will thrust.  
Clairvoyant he must be to know before the work's begun  
Exactly how the thing, complete, will look when it is done.

*Au fait* in all materials, in every kind of stone,  
Which best will hang together and which will stand alone;  
Not stuck on stucco, but in clays familiar as a potter,  
And be on *terra firma* when he talks of *terra cotta*.

Then he must pile up harmony, both presto and audante,  
And take care of his capital when he puts up his ante.  
He must be fully posted on his heating and his frieze,  
And the lining of his architrave must not bag at the knees.

His members, frames, groins, ribs and feet would puzzle any doctor;  
His attics and his lofty forms electrify the proctor.  
No laundress or musician knows so much as he of fluting,  
His mouldings way up to O. G., as well as his mail chuting.

Slate, tiles, conductors, shingles, tin, eaves, cornices and flues,  
Paints, oils, stains, putty, fillers, glass, the finishes they use,  
Acoustics, optics, papers, paint, interior decoration,  
Distempers, dog-teeth, dados, plumbs, jambs, beads of every nation.

There's tensile strength and crushing strain, and fireproof construction  
Plumbing and gas, electric work, and ventilating suction,  
Lime, mortar, plaster, cement, bricks, locks, bolts, door closers, hinges,  
And with each peculiar client know just where the shoe impinges.

Boilers and fuel, pipes, exhaust, the fastest elevator,  
Cold storage as embodied in the Wickes refrigerator,  
Ranges and grates and furnaces, the principles of Ruskin,  
The better points of every school, Assyrian, Greek, Etruscan.

Stair builder! mason! carpenter! designer! what a head!  
'Tis marvelous that "Fools rush in where angels fear to tread."  
He gives his best for perfect work, and when he's done it all,  
He finds his labor is in vain, "That closet is too small!"

### A DWELLING AT AUGUSTA, MAINE.

We publish on page 23 a dwelling of low cost, erected for D. W. Emery, Esq., from plans prepared by the proprietor. Dimensions: Front 33 ft., side 49 ft. Height of ceilings: Cellar 7 ft., first story 9 ft., second 8 ft. 6 in., third 8 ft. Underpinning of granite. The building above is of wood, with the exterior framework sheathed and then covered with paper. The first story is clapboarded and painted light brown, with dark brown trimmings; second story and gables are shingled and painted light yellow. Blinds are painted red. Roof shingled and painted red. The plan is laid out in the shape of a cross, the entrance and hall being at side, while the various apartments are thrown out around same. Hall contains a staircase of unique design, turned out of cherry. This hall and staircase are lighted effectively with stained glass windows, and the former contains a fireplace, built of brick, with hearth laid with same. The interior throughout is trimmed



with whitewood. Hall, parlor and dining room are stained cherry, the two latter having bay windows and open fireplaces trimmed with tiles and hard wood mantels. Kitchen and pantry are wainscoted and fitted up complete. There are three bed rooms, den, and bath room on second floor, and two bed rooms and storage on third floor. These apartments are trimmed with whitewood, also, and are stained cherry. Bath room wainscoted and replete. Cemented cellar contains furnace, laundry, etc. Cost \$3,200 complete. Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

#### RESIDENCE OF MR. WILLIAM DE HART, CARTHAGE, ILLINOIS.

This handsome dwelling, designed in the style of modern Romanesque, consists of eight rooms on the first floor, and cost complete about \$8,000. George W. Payne, architect, Carthage, Ill. The front entrance leads through a vestibule into a sitting or reception hall with tiled floor, open grate, and an arched recess. Connected with this by sliding doors are two parlors, with passages leading from the rear one to a large bed room, the kitchen and a pleasant dining room, in which is a large bay window and a cozy fireplace. This room is also entered from the side piazza. The main stairway, rising from the sitting hall, is of red oak, beautifully moulded, with three stained glass windows as shown in the illustration. The hall and parlors are finished in red oak, the kitchen and dining room in Southern yellow pine, and the remaining rooms in white pine, nearly all of which are in natural finish. The house is well plumbed and heated by hot water, and is supplied with bath room, water closets, and wash bowls. The first story is eleven feet and the second nine feet high. The attics are finished off to correspond with the other portions of the structure.—*The Architectural Era.*

#### A RESIDENCE AT BELLE HAVEN.

We present on pages 24 and 25 a residence, colonial in treatment, recently erected for Mr. Charles A. Moore, at Belle Haven, Greenwich, Connecticut. It has a broad and spacious piazza, porte cochere, bay windows, and an interior arrangement showing numerous large rooms. The underpinning is built of local bluestone, laid rock faced; the building above this is sheathed, clapboarded and painted colonial yellow, with ivory white trimmings. The circular arches and balustrade to piazza are shingled and painted similar. Roof shingled. Dimensions: Front, 65 ft.; side, 48 ft., exclusive of piazza. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. All main rooms on first floor have 6 ft. wide entrances (with sliding doors), so that they can be thrown into one suite. Main hall, 14 ft. x 28 ft. 6 in. It is in colonial style and finished in antique oak. The ceiling is heavily beamed, forming deep panels. Fireplace has a tiled hearth, with wrought iron trimmings and a hard wood mantel. This hall, also, is provided with a paneled divan, and staircase with carved newels, which is lighted effectively with large stained glass windows. Floors throughout are of hard wood. Drawing room is finished in ivory white and gilt, the floor being painted in cream white. Fireplace has a hearth laid with ivory white tiles and a mantel of exquisite design. Dining room is trimmed with antique oak, and is provided with a mantel of similar wood. Billiard room trimmed with whitewood, contains a brick fireplace, with hearth laid with same. Kitchen and its apartments are trimmed with yellow pine, finished natural with hard oil, and are fitted up complete in all their appointments. There are five bed rooms, with large closets, and bath room on the second floor, and two trunk rooms and four bed rooms on third floor. These apartments are trimmed with whitewood, finished natural with hard oil. Bath room is wainscoted with white English tiles, and is furnished in an excellent manner. Cemented cellar contains laundry, furnace, and other apartments. It is lathed and plastered throughout. Cost, \$14,000 complete, estimated. Messrs. Bornig, Tilton & Mellen, architects, New York. Our engravings were made direct from photographs of the building taken especially for the SCIENTIFIC AMERICAN.

THE church had been erected, the usual dinner was given, and at the conclusion the health of the builder was proposed, when he rather enigmatically replied that he was "more fitted for the scaffold than for public speaking."

#### A COLONIAL RESIDENCE.

On page 27 will be found an engraving and floor plans of a residence, colonial in treatment, erected recently for James Sawtell, Esq., at Brookline, Mass. Dimensions: Front 50 ft., side 71 ft., not including front porch. Height of ceilings: Cellar 8 ft., first story 10 ft., second 9 ft., third 9 ft. Underpinning is built up with Chestnut Hill stone, laid rock-faced ashlar. The superstructure above is of wood, covered with clapboarding and painted colonial yellow with white trimmings. Roof shingled and painted red. Blinds painted bottle (bronze) green. The several rooms communicating as they do makes a most attractive vista of the entire floor. The first floor is handsomely finished. The reception hall and dining room are trimmed with antique oak, the walls and ceilings being wainscoted and elaborately paneled. The broad staircase, with carved newels, antique mantel, and paneled divan, are the features of hall. Floors are laid with hard wood and are highly polished. Parlor and music room are treated in a delicate manner with white (china gloss) and a little gilt, the former having a fireplace, furnished with white enameled tiles and a mantel elegantly carved. Library is trimmed with mahogany and fitted up with bookcases, fireplaces, etc. Kitchen and its apartments, conveniently located, are trimmed and wainscoted with hard pine, finished natural. The butler's pantry is of sufficient size to contain the usual fixtures, dressers, closets, bowl, etc. The second floor contains four bed rooms, large closets, den, and bath room, besides servants' bed room and bath. These apartments are trimmed with various kinds of hard wood respectively.



A RESIDENCE AT CARTHAGE, ILL.—VIEW IN HALL.

Bath rooms are wainscoted and furnished in the best possible manner. There are three bed rooms, billiard room and storage on third floor. Cemented cellar contains laundry, furnace, and other necessary apartments. Heated by steam. Cost \$18,000 complete. Mr. Willard T. Sears, architect, Boston, Mass. Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

#### Waterproof Wall Coatings.

Dr. T. Koller, of Munich, has published in *Glaser's Annalen* some useful information which he has collected with reference to the waterproofing of brickwork, concrete, etc. He strongly recommends whitewash containing a little common salt, which makes a waterproof wash. The peculiar quality of this simple mixture was discovered by a curious accident. A laborer employed lime-washing in a private house accidentally upset a salt box; and in order to conceal the disaster, he swept the contents of the box into his pail. It was afterward found out that the wash had set as hard as cement, and would bear being scrubbed. This led to experiments, among other tests being that of white-washing the walls of a well, the material being applied with a syringe where a brush would not serve; and in this case the salted whitewash was as good as ever four years after application. Dr. Koller attributes this curious effect of adding salt to limewash to the absorption of water by the salt, thus enabling the lime to combine with the carbonic acid of the atmosphere and form a hard and durable coating.

For waterproofing buildings much exposed, a solution of melted paraffin in three parts of heavy coal tar oil is recommended. This paint must be applied hot, which

may be conveniently managed by keeping the paint pot in a bucket of hot water. Water glass, for waterproofing walls, has fallen somewhat into discredit of late, which Dr. Koller ascribes to improper usage. The composition should be applied as follows, after the walling has had abundance of time for setting: Ten parts of sharp, dry sand, three parts of air-slaked lime, two parts of chalk or pulverized limestone, and soda water glass of 33° Baume are the ingredients. The water glass is diluted with twice its weight of water; and the other materials are then mixed with it, until it has about the same consistency as mortar, in which state it is to be applied to the wall surface. In a day or two the coating becomes as hard as stone, after which one or two more coats may be laid on.

#### Colored Woods.

Almost all of the light colored woods which are used for the interior finish of cars are liable to become darker by the action of light and varnish. Cars finished in the lightest ash show a very perceptible darkening in the course of eighteen months or two years. The general tendency is to grow yellow, whether the finish be of varnish or oil, dead or bright. The lighter the color of the wood, the longer the time before it reaches an unpleasant depth of color. Perfect wood, free from blemishes and light in color, is not easily found. In some sections of the country the difficulty of getting it is so great that an inferior quality has to be accepted.

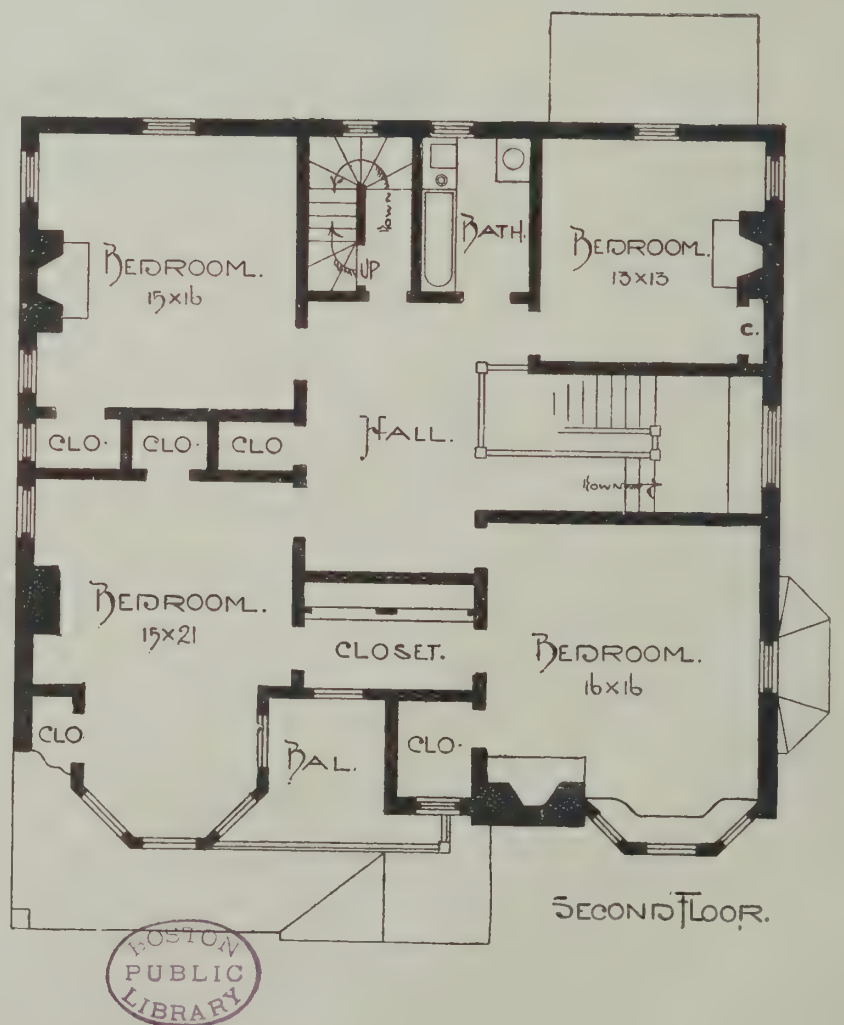
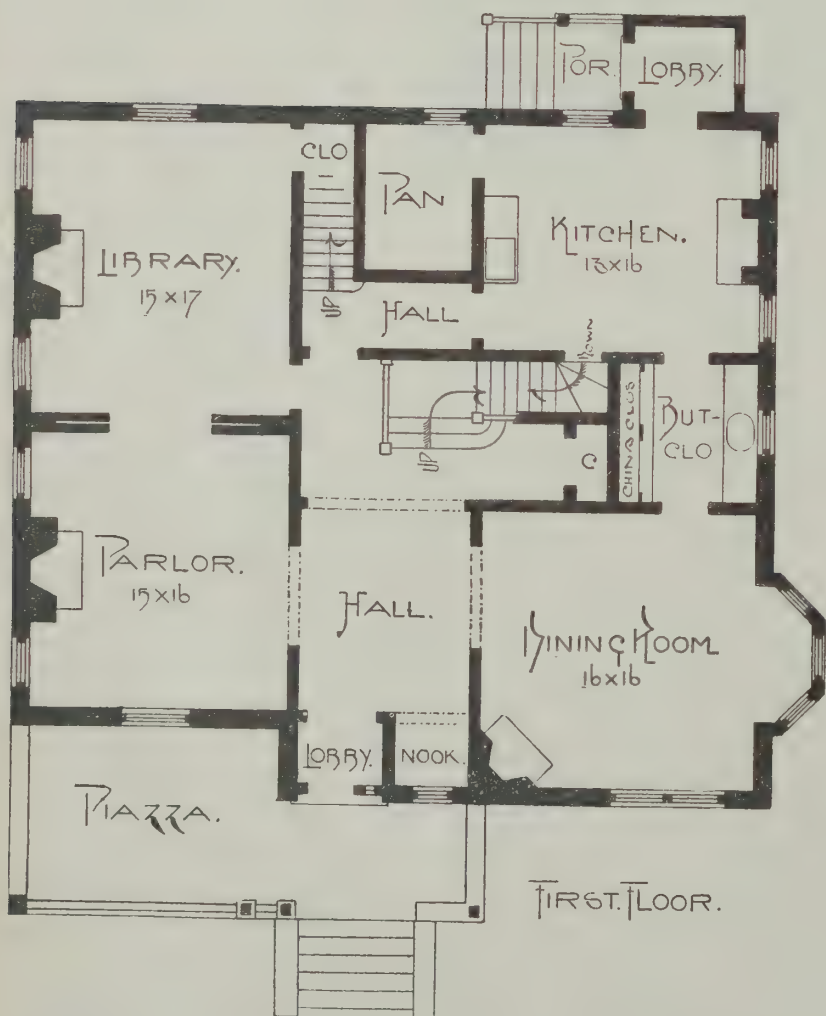
Roads which run through districts abounding in fine ash are particularly fortunate, as they can get what may be called "water white" clear lumber, free from heart wood, without paying a higher price for it than the ordinary grades. Several advantages are gained by the use of very fine whitewoods. The first is the greater resistance to darkening, which prolongs the life of the inside finish. Next in importance is the improved appearance of the car and the increase in the light at night. The difference between a dark and a light finish, as nearly as can be ascertained without actual photometric tests, is about 60 per cent. White and rock maple when first finished are lighter in color than ash. The white maple has little or no grain, and the rock, waved or bird's eye maple turns yellow very quickly. Both of them are in this respect somewhat inferior to ash. Maple contains a considerable proportion of tannic acid and is easily and quickly stained by the application of iron solutions. When stained properly, it appears to hold its color well. Although not very deep in color, it resists fairly well the darkening action of both varnish and light. Other woods are often stained to improve or change their color.

In pines the change of color under the action of light is due to the resin. When this is removed the wood remains white or very light in color. The resin and the yellow color, by action of soap and water, are entirely removed. Soda or potash solutions, followed by oxalic acid, discharge the color and leave the wood nearly white. Chloride of lime or bleaching powder can be used for bleaching. Potash in a concentrated form actually destroys wood fiber and produces great discoloration. A weak potash solution, followed by oxalic acid, is a powerful bleach, and would be useful on many different kinds of wood. Chemically, there should be no difficulty in removing the coloring matter from the heart wood of ash nor in bleaching any of the common hard woods used for finishing. After the color has been discharged from the wood, the greatest variety of effects may be produced by staining or dyeing. The yellow browns or reds of the woods prevent the use of a large amount of the dyes which would otherwise be suitable for the purpose. With a properly bleached wood almost any transparent color could be used for a stain. There is a Japanese method of treating wood for backgrounds or ornamental work which is well worth attention. It consists in removing the softer portions of the fiber so as to leave the remaining grain in high relief.—*Nat. Car Builder.*

#### Plans and Specifications.

Full plans and specifications complete, ready for the builder, may be obtained at this office, for any of the structures illustrated in this publication. We also prepare plans for buildings of every description, including dwellings, churches, schools, stores, barns, carriage houses, etc. Our work extends to all parts of the country. We are assisted by able architects. Terms moderate. MUNN & Co., 361 Broadway, New York.





[See page 18.]

A RESIDENCE AT PORTLAND, ME.

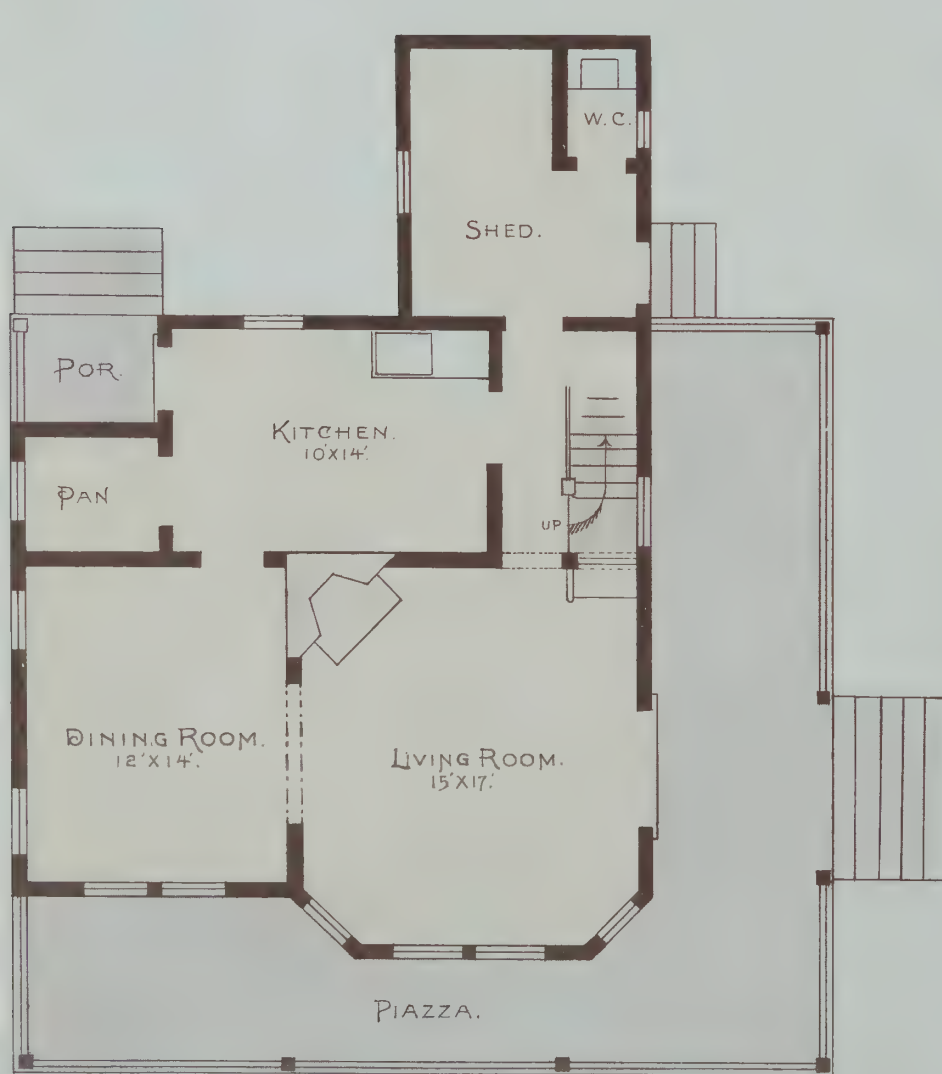




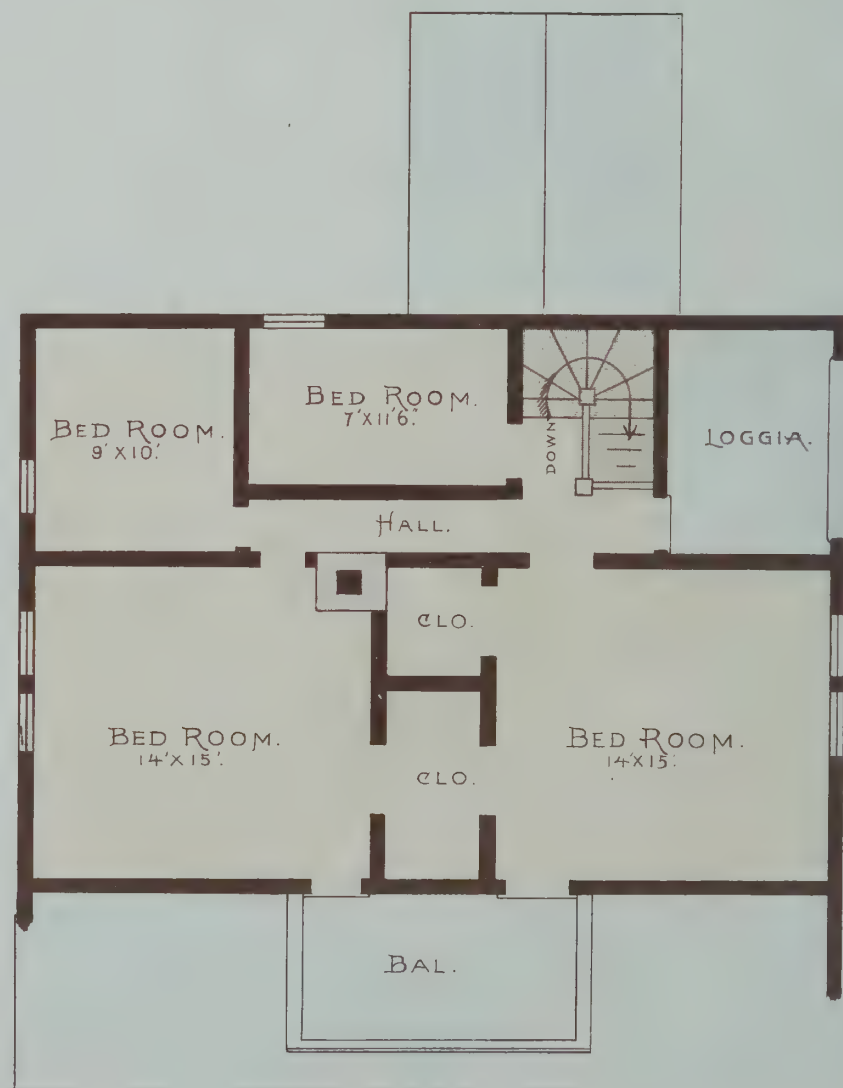




A COTTAGE IN MAINE.- COST.\$ 900.



FIRST FLOOR.



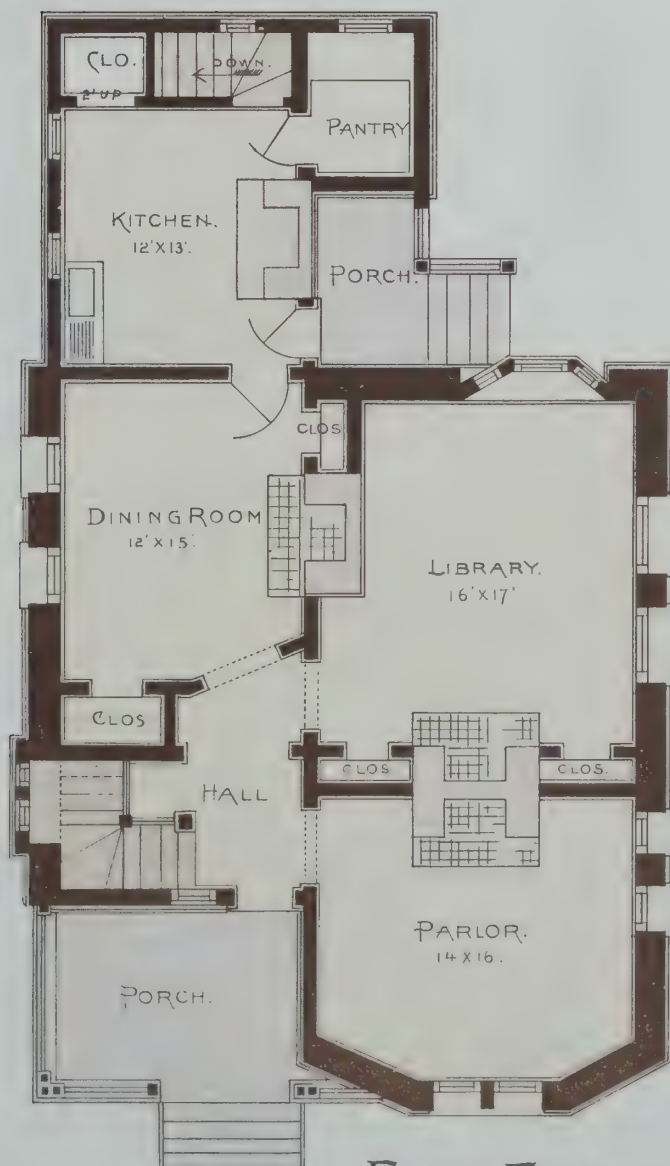
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A Cottage at Short Hills, N.J.



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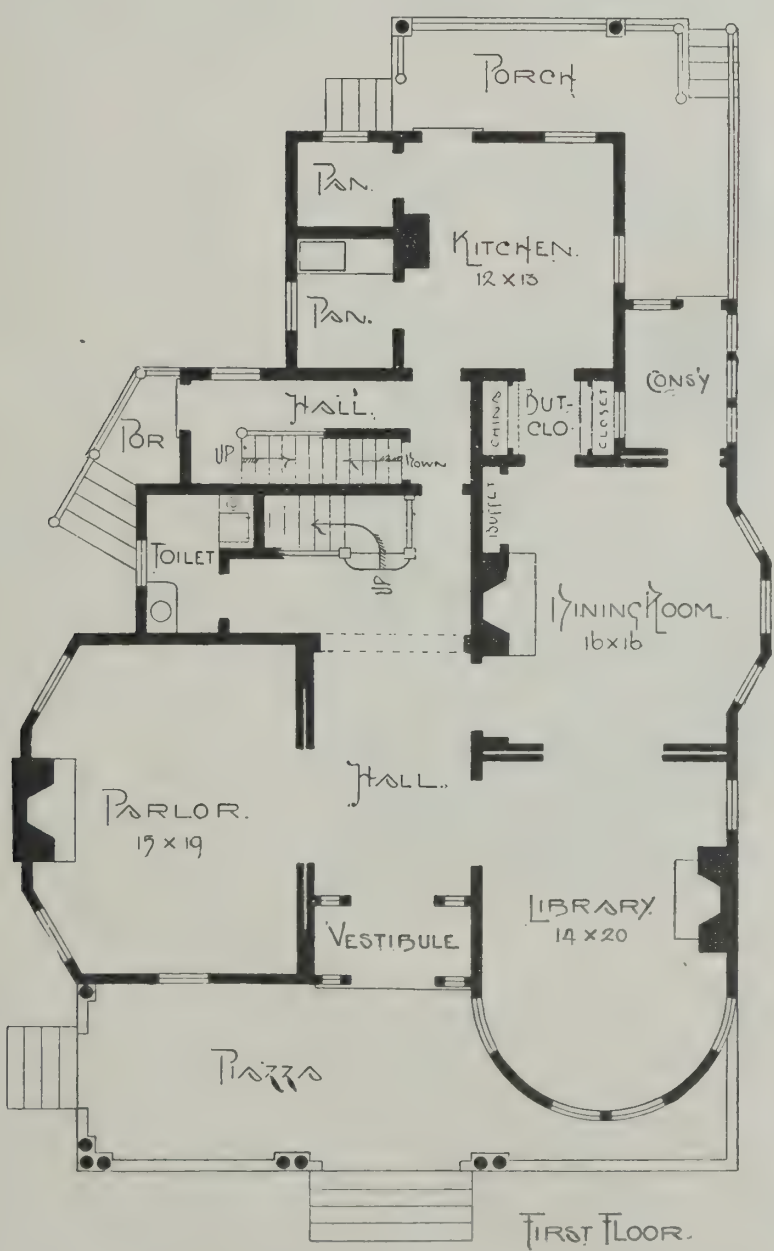
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[See page 18.]  
A RESIDENCE AT PORTLAND, ME.



## AN ARCHITECT'S HOME.

"Netherheys," Watford, the residence of W. Wallis Baldwin, architect. To design a house on a small scale which shall have the comfort and convenience of a large one is not an easy matter, or, if it be easy, it is not often done. In houses of little more than cottage dimensions there is generally a nip or a pinch somewhere; entrance, parlors, bedroom, or kitchen usually succumb to some hardship of size, aspect, or shape. But in "Netherheys" there has been a very critical adjustment of claims; in fact, so nice did it appear to me that I feel much indebted to the architect owner for his permission to publish the plan, which explains for the benefit of others how he has worked out the problem of making a small house thoroughly cozy, comfortable, and complete.

In an area of less than an acre, surrounded on two sides by broad roads, in the suburbs of Watford, "Netherheys" has advantages of position, aspect, and surroundings which are not usually devoted to so small a house. By the design of its exterior the cottage-like appearance is very marked, more especially on the entrance front. Passing through the quaintly designed gateway, the drive opens into a square gravel court bordered by square-cut yew hedges. It will be seen from the plan that the outbuilding to the left flanks and protects the entrance agreeably, and between this and the stair turret is a paved landing. The porch is nicely finished with marble step, mosaic floor, high dado of oak framing with serge panels, and leather paper wall filling and ceiling. A good feature, and one we seldom meet with, is the circular stair turret. The stairs are shut off from the porch by a doorway, and from the hall by a curtained archway. This semicircular arch repeats at the other end of the hall, and within it are arranged in a V-shape the doors to the drawing room and own room (see sketch). This little hall is a great feature of comfort in the house with its little corner fireplace (hooded over from marble jambs) and long five-light window with fixed seat under. Generally speaking the good points of the plan will be obvious to many of my readers. The dining room is conveniently served from the kitchen, as much out of sight and sound as is possible in a small house, and far more so than one usually finds in large houses. The fireplace recess is just deep enough to provide comfortable fixed seats at either side of the mantel jambs, and gives a very convenient breadth to the room. The garden porch forms a useful connection between the dining and drawing rooms. The drawing room is a pretty apartment, with a sort of orange-colored paper, specially printed for the architect. The third room is fitted as a sort of library and business room, with an arched fireplace recess. The bedrooms, bathroom, and upper corridor landing are all nicely treated. A long terrace and Dutch flower garden are good items in the surroundings which my sketches indicate. (See pages 28 and 29.)

As the proof of a pudding is in the eating, so we may say of a house that a proof of its comfort is found by living in it, and we can safely affirm that in all our wanderings we have never realized more fully the benefits of a well designed modern English home than at "Netherheys."—*T. Raffles Davison, The Brit. Arch.*

If any of our readers have made an invention for which they have thoughts of taking a patent, they are invited to communicate with Messrs. Munn & Co., the publishers of this paper, who for a period of forty-three years have conducted a most successful bureau in this line. A pamphlet of instructions will be sent free, containing full directions how to obtain a patent, costs, etc. In very many cases, owing to their long experience, they can tell at once whether a patent probably can be obtained; and advice of this kind they are always happy to furnish free of charge. Address Munn & Co., SCIENTIFIC AMERICAN office, New York.

## The Planning and Construction of American Frame Houses.

Mr. C. H. Brodie recently read before the Architectural Association a paper on this subject, illustrated by some sketches, details, and tracings by the author, and also by numerous plans and perspectives from the United States professional journals, says *Building News*. Mr. Brodie mentioned that he was engaged on business in America during the winter of 1887 and the spring of 1888, during which period he spent considerable time in New York and Chicago, with flying visits to Boston, Baltimore, Philadelphia, Washington, Pittsburg, St. Louis, Kansas City, Milwaukee, St. Paul, and Minneapolis, and other cities. Such houses as were illus-

mense rafts floated down the great rivers to convenient points for transport by rail or boat. A frame house may be very expeditiously erected. The drawings on the walls show a basement, arising only one foot or so out of the ground, built of either brick or undressed stone, and on this is a frame of quarter partitions, two stories high, forming inclosure and divisions. These and the joints being fixed in position, the roof can be immediately constructed and covered in, so that while the outside is being completed, the inside, too, is progressing, and during the time that we should be getting up a scaffold, the frame house is built. The plasterwork being then, if necessary, dried by artificial heat, the joinery and other fittings are placed, and

the dwelling is ready for occupation in a very short time. Should the worthy owner's family increase, additions to the house are just as easily and expeditiously made. The plans show a basement and two upper stories, and the roofs being mostly of steep pitch, plenty of room for attics is obtained in them. The basement contains a laundry, beer and wine cellars, coal cellars for both house and furnace coal, larders, and the heating chamber, containing either a boiler for steam or a furnace for hot-air heating. The heat there generated is distributed by ducts quite evenly over the whole house, and most of the rooms have no fireplaces. This is a stage of civilization to which we have not yet generally attained. Where fireplaces do occur—and this is chiefly on the ground floor—an ash pit is provided under each, into which, when the hearth is swept up, the ashes, etc., are dropped by moving a dump or hopper. These ash pits are marked on the basement plans. The ducts serve in the hot weather to distribute cold air over the house, the air in the cellar, whence they start, being naturally cooler than that outside, while it can, if necessary, be cooled still further by artificial means.

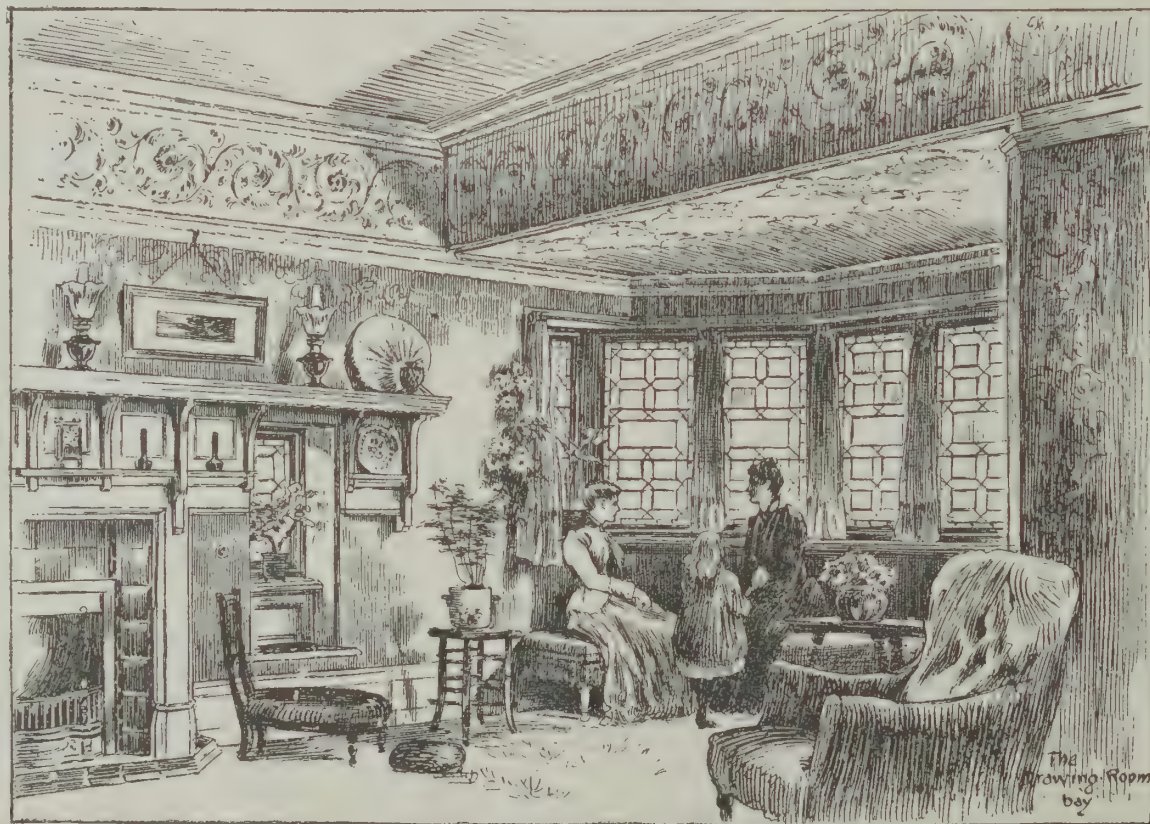
Coming to the ground floor or first story, as their plans have it, we find a parlor and dining room, and also perhaps a library or a second parlor. The dining room is always in connection with the kitchen, through a lobby or pantry. You will note, also, that there is no scullery

shown, although on some of the plans is a diminutive space marked "sink room." On this floor are also various store rooms and closets, water closets, lavatory, etc., depending as to size, number and variety on the general dimensions of the house. And here I would call special attention to the very complete way in which all classes of American houses are fitted with cupboards, shelves, drawers, sideboards, bookcases, etc., all conducting in so eminent a degree to the comfort and ease of the occupants. No bedroom that I occupied in any private house in the States was without a cupboard large enough to walk into and turn round in. The convenience of this is too obvious to need expression. The hall is always furnished, and used as a room; most of the American plans have it designated "reception hall," and some even "sitting room." The veranda is also a most important feature, and one

never omitted. During the hot season it is inclosed with blinds, and becomes the most frequented part of the house. The first floor has the usual bed and bath rooms, linen closet, etc. You will observe that in most cases the water closet apparatus is kept away from, and not, as with us, next to the outside walls. This is to avoid fracture by freezing during the intensely cold weather. To return to our first floor plan.

You will note that all the chief bedrooms have a fixed lavatory fitted, generally, in a cupboard, so as to be out of sight. This adds, of course, very considerably to the plumber's bill, but in the long run it is a great saving, for labor of all kinds is terribly costly. Balconies are freely provided on this floor, and are delightful spots in the hot weather, while they always form a feature in the elevations. The attics are used for servants

(Continued on page 23.)

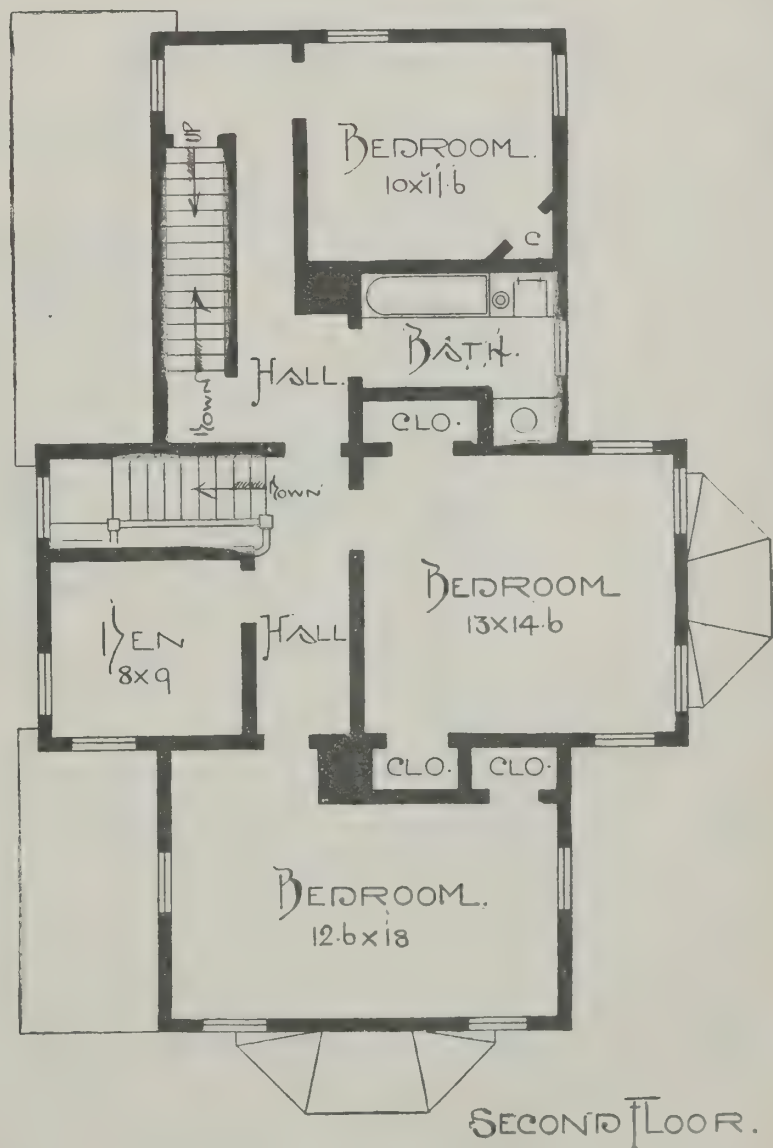
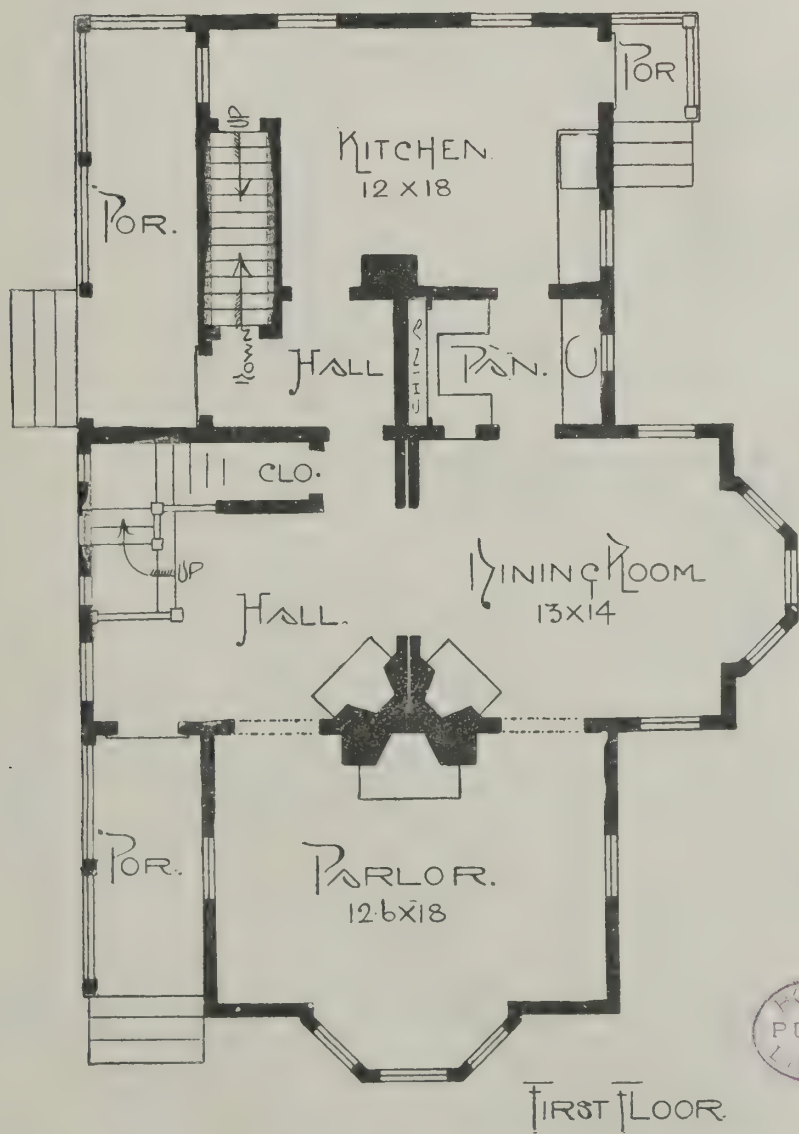


## AN ARCHITECT'S HOME.

trated on the walls are, he remarked, the type of American homes, alike in the North, South, East, and West. In the actual town area, the erection of timber houses is now forbidden. Still, in the Southern States universally, and over the country and suburban districts generally, it is rarely that any but timber houses are erected. The average time for erecting a frame house is ninety days, but many have been built in sixty, and while the life of the structure may be averaged fifty years, there are very many in existence even one hundred and some two hundred years old and over.

Again, stone quarries as yet worked are few and far between, and brickworks are not by any means numerous. But the country abounds with the most beautiful timber, with which even the denuded Eastern States are kept plentifully supplied by means of im-





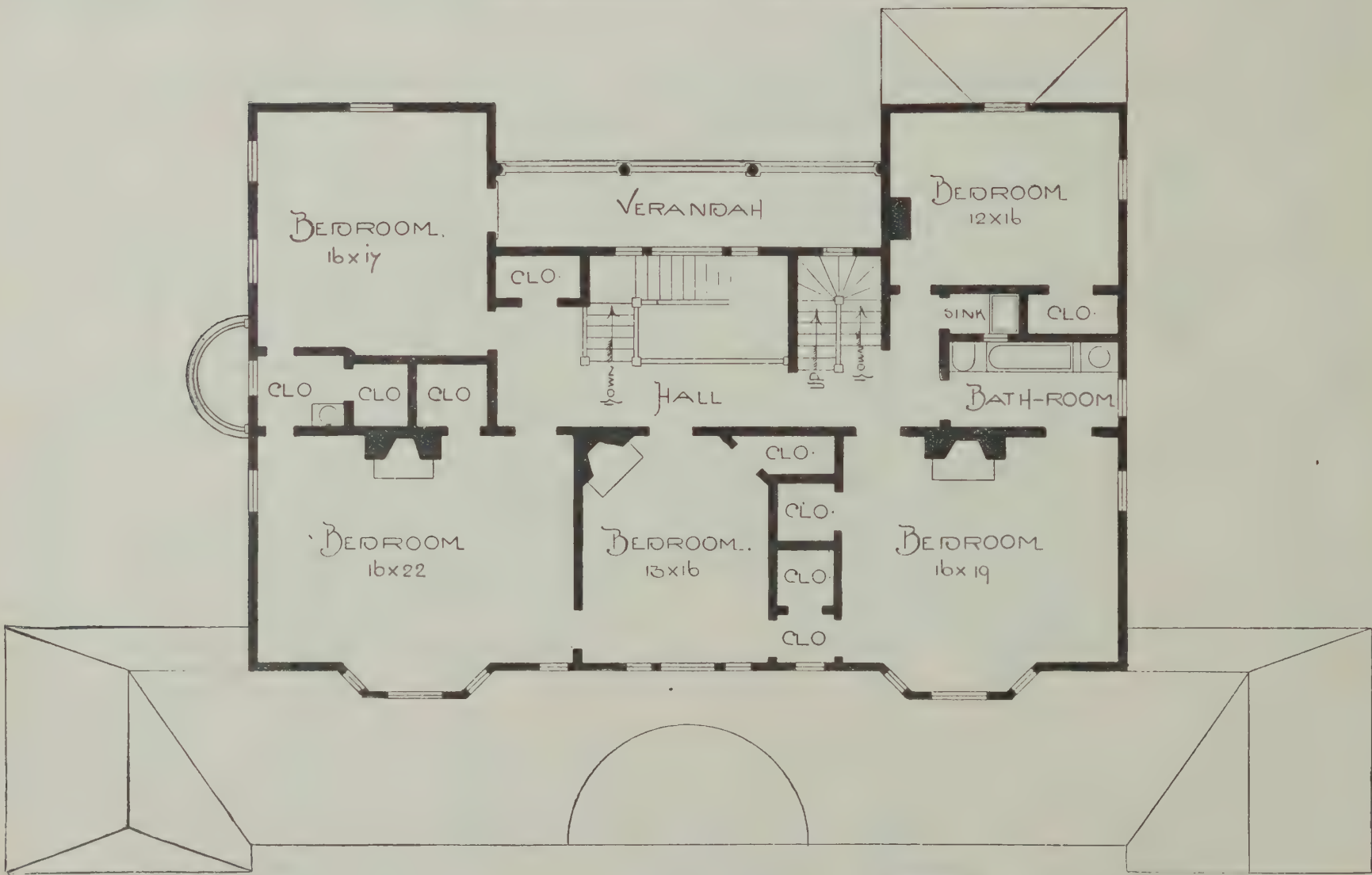
[See page 18.]

A RESIDENCE AT AUGUSTA, ME.





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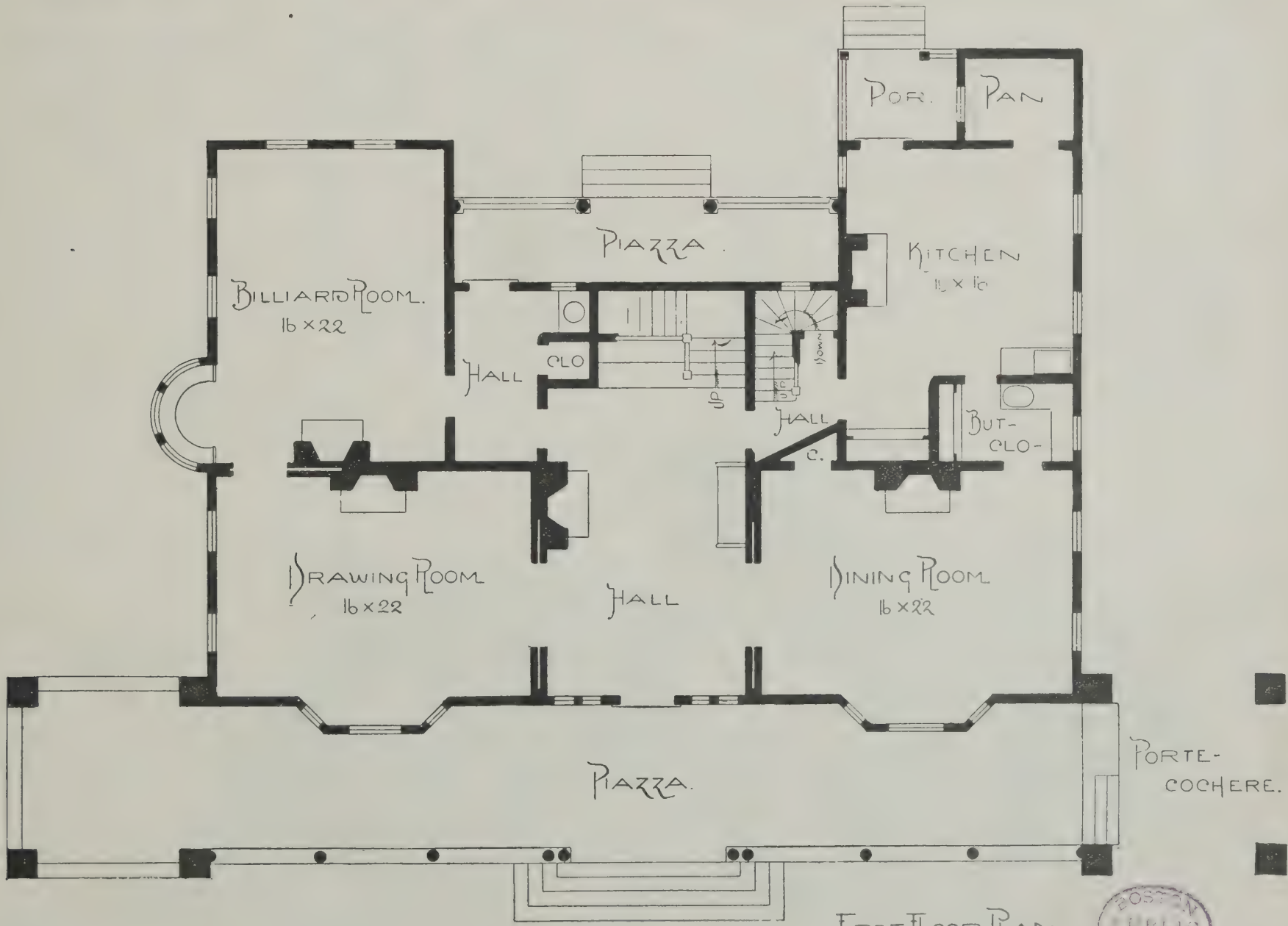
SECOND FLOOR PLAN.



[See page 19.]

A RESIDENCE AT BELL HAVEN PARK.



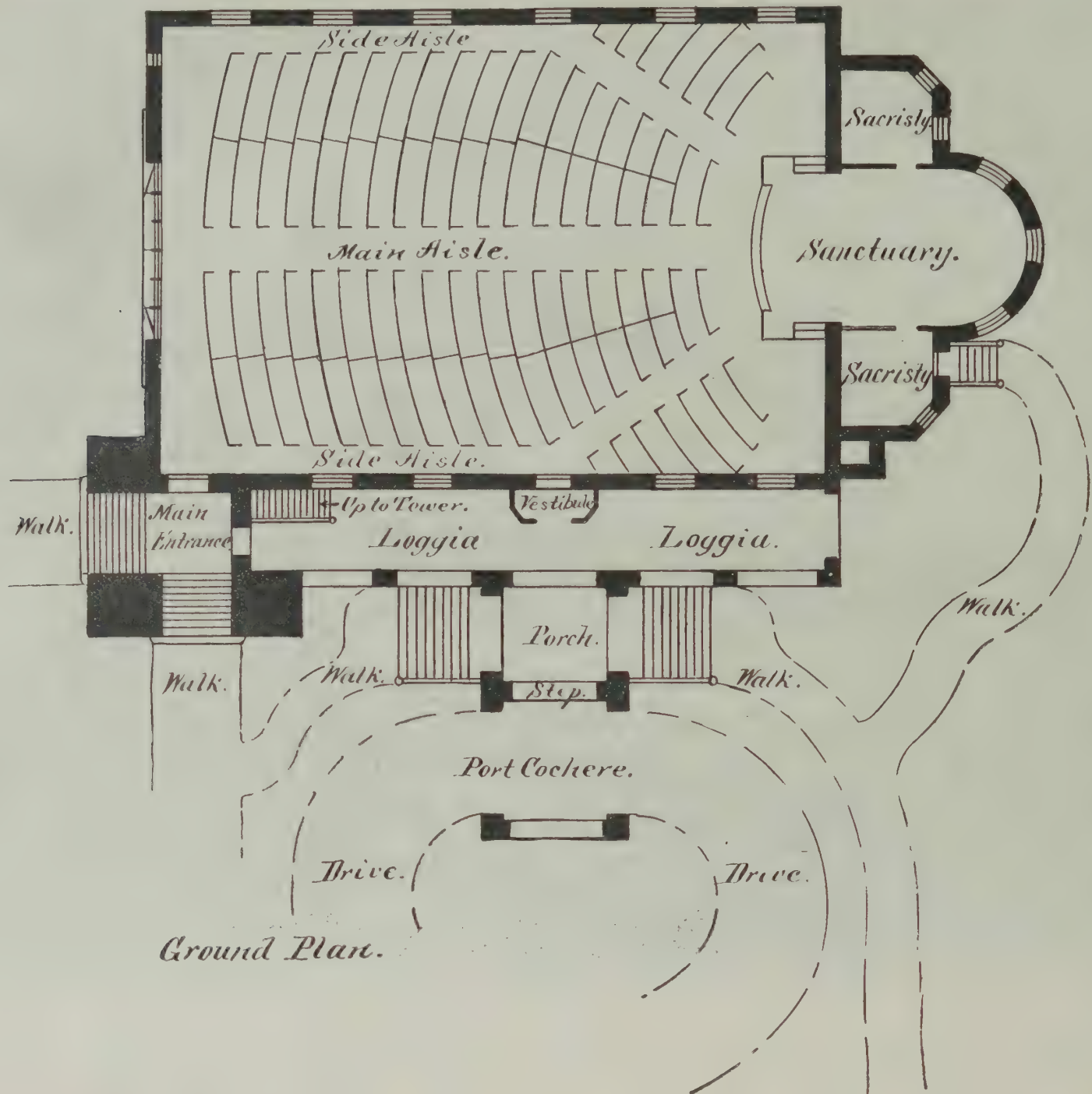


[See page 19.]

A RESIDENCE AT BELL HAVEN PARK.







A SUBURBAN CHAPEL.

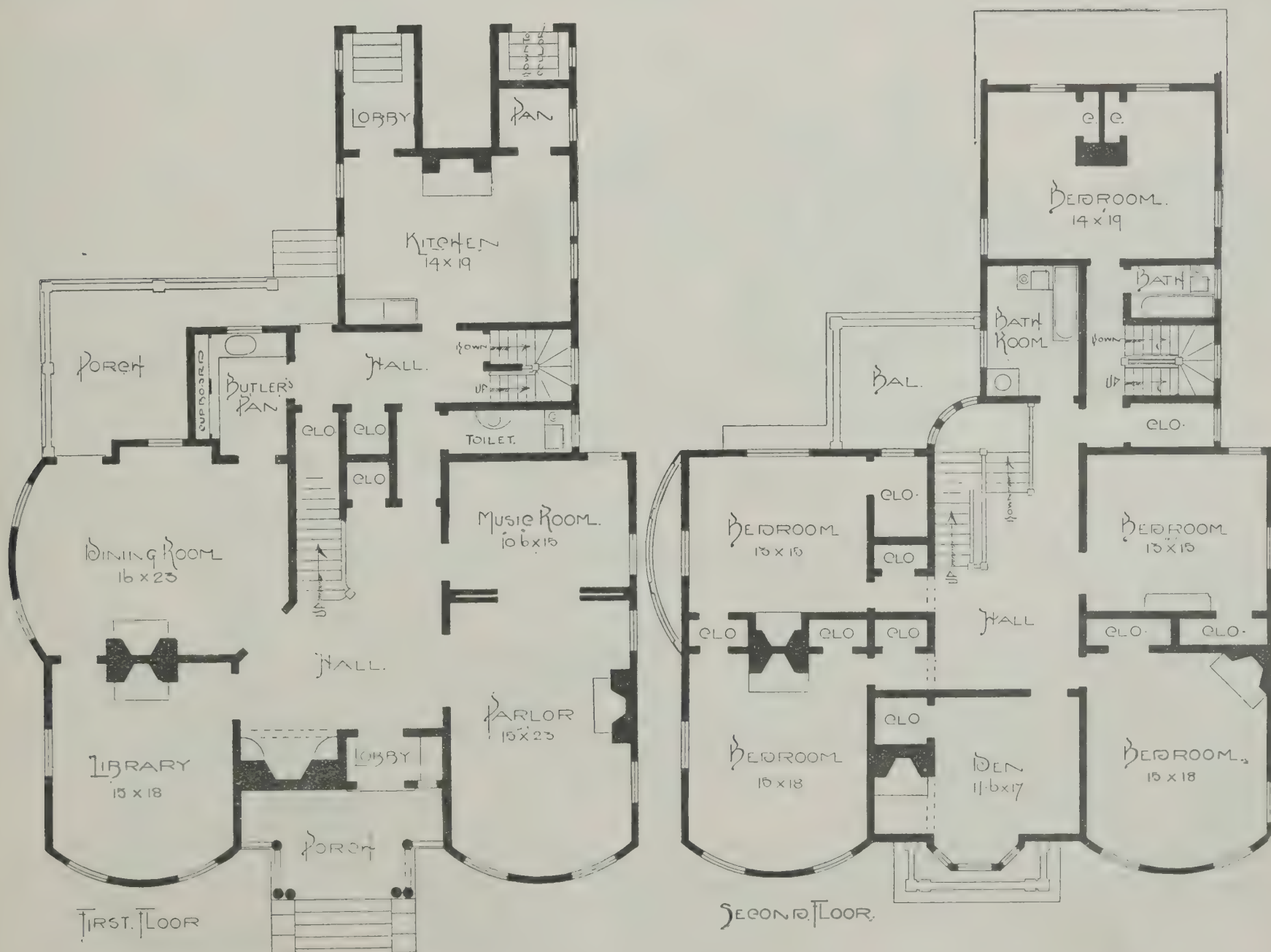
ST. PAUL ARCHITECTURAL SKETCH CLUB COMPETITION—SUBMITTED BY O. M. HOKANSON.—From the Northwestern Architect.







SCIENTIFIC AMERICAN.



[See page 19.]

A COLONIAL RESIDENCE.







### The Planning and Construction of American Frame Houses.

(Continued from page 22.)

rooms—each still with a good cupboard—box rooms, store rooms, etc., or the space is frequently just floored and then left to be cut up as the wants of the occupants may later on suggest. About the elevations, outside and in, or the artistic part, one need say nothing, except that, to our eyes, the calm and dignified treatment of the English example contrasts very favorably with the fussiness and over-picturesqueness and evident striving after “features” which spoils so many of the other designs. The construction you can study at your leisure by referring to a specification printed in black, which is in the Institute Library. It is indexed under the name of the publishers, Messrs. Palliser, of New York, to whom I am indebted for a good deal of the information this paper contains, and for a drawing and specification hung on the wall. I was struck with the very practical character of the specification. For instance, among the general clauses I read: “The carpenter will make all patterns, etc., and will provide suitable protections to all openings to keep out the cold, rain, etc., and will clear the building of all carpenter’s waste materials before the plastering is commenced.



The Terrace Front

The mason must provide coal and stove in cold weather for heating the building while his work is going forward and until it is dry.”

Continuing, we shall get particulars how this class of house is put together, and we naturally find after the general clauses the necessary directions as to the excavations. The only unusual point here is: “The bank is to be dug well away from the walls, and left open until the walls are set and dry.” The damp course is to be either slate and cement or asphalt. The brick walls are required to be built to “a true line from one end to the other, even to the cutting of a brick where necessary, so that a carpenter can size the joints to an exact width, and place them directly upon the wall without blocking up with chips or pieces of wood.” The facing of these brick walls is to be “neatly tuckered and properly cleaned down with aquafortis, and oiled with raw linseed oil at completion,” care being taken not to injure, in cleaning down with acid, any cut stone work.

The laths for lathing are to be “laid a full one-fourth inch apart, and joints broken every eighteen inches.” Wood laths, however, are now rarely used. I never saw any at all. The plastering is put on wire netting, or one of the many forms of pierced or ex-

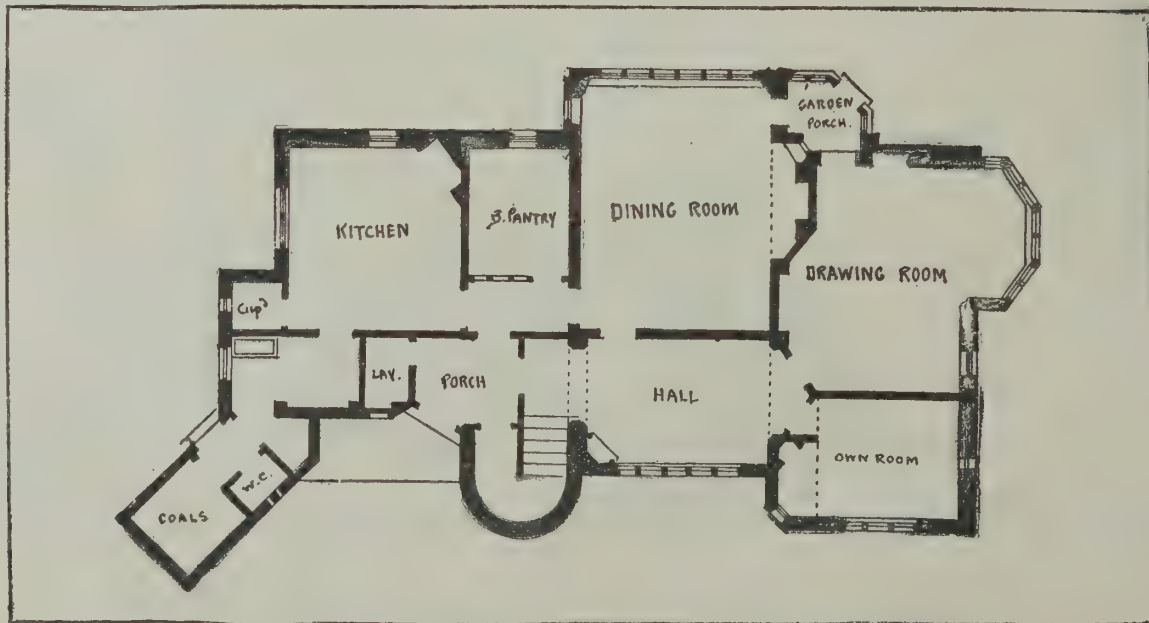
panded metal now coming into use in this country. The plastering is to consist of “a good coat of brown, well-haired mortar, made of pure unslaked lime and clean, sharp bank sand, free from loam and salt, and best cattle or goat hair, well mixed by continued working, and stacked in the rough for at least — weeks before putting on.” The finish is to be “a coat of best soap-stone finish, manufactured by the company, composed of finishing lime putty (two parts) and patent soap-stone finishing (three parts), thoroughly mixed two days before using, and applied in the most careful manner, as per directions”—I suppose of the manufacturers. The order of the trades as they are placed in the specification differs considerably from our usual arrangement; and we next come to the carpenter and joiner. All the timber which will be exposed at the finish is required to be of a certain quality pine. The joists are to be placed, in all cases, with the “crowning” edge upward, and those over so many feet in length are to be “worked crowning” so many inches before being placed in the building. Describing the partitions—a most important item of a framed house—the specification directs that “all door and window studs are to be set double, and all openings over three



The Entrance Front

feet wide trussed overhead. All angles must be formed solid by blocking and spiking two studs together. No studs are to stand on the floor, nor on the joists, if there are partitions under, but all are to foot on top of the partition plate below.”

The outside of the external partitions, and also the roof, is covered with seven-eighths inch matched boarding, called “sheathing,” which has to be “nailed at each edge at every bearing with 10d. nails.” Nails are throughout the specifications described as so many “penny” ones—a nomenclature common also in Ireland. The whole exterior is then covered with waterproof felt, the joints lapping two inches, and it is tarred under all architraves, friezes, cornices, brackets, etc., “so as to make a perfectly tight job.” Outside this felt comes the finish which is actually seen, which on the partitions is weatherboarding, or, as it is called in the States, “clapboarding.” This is to be of “clear, beveled white pine, five inches in width by one-half inch thick at the butt, and three-sixteenths inch at the thin edge, laid with not less than a lap of one and one-fourth inch, and nailed with 8d. box nails every sixteen inches. The nails are to be set in.” The veranda floor is to be constructed with one and one-fourth inch by three and one-half inch white pine boards, laid with “paint joints.” The roof is generally covered with



AN ARCHITECT'S HOME.—[See page 22.]



shingles, and so also are the gables and other features. The shingles are usually of cypress, which grows abundantly in the swamps of New Jersey and the more Southern States. The logs are floated down the river to the various mills, where the shingles are cut in enormous numbers. One mill cuts 300,000 daily. They are eighteen inches by six inches and are on battens, width on roofs five and one-half inches to the weather, and on vertical parts six inches, each nailed with two nails, and kept three inches from angle of valleys. Sometimes the roofs are of slate, and frequently they are flat, in which case they are mostly covered with tin, although asphaltum or gravel composition is sometimes used. In either case the roof is boarded on the joists with seven-eighths inch boarding.

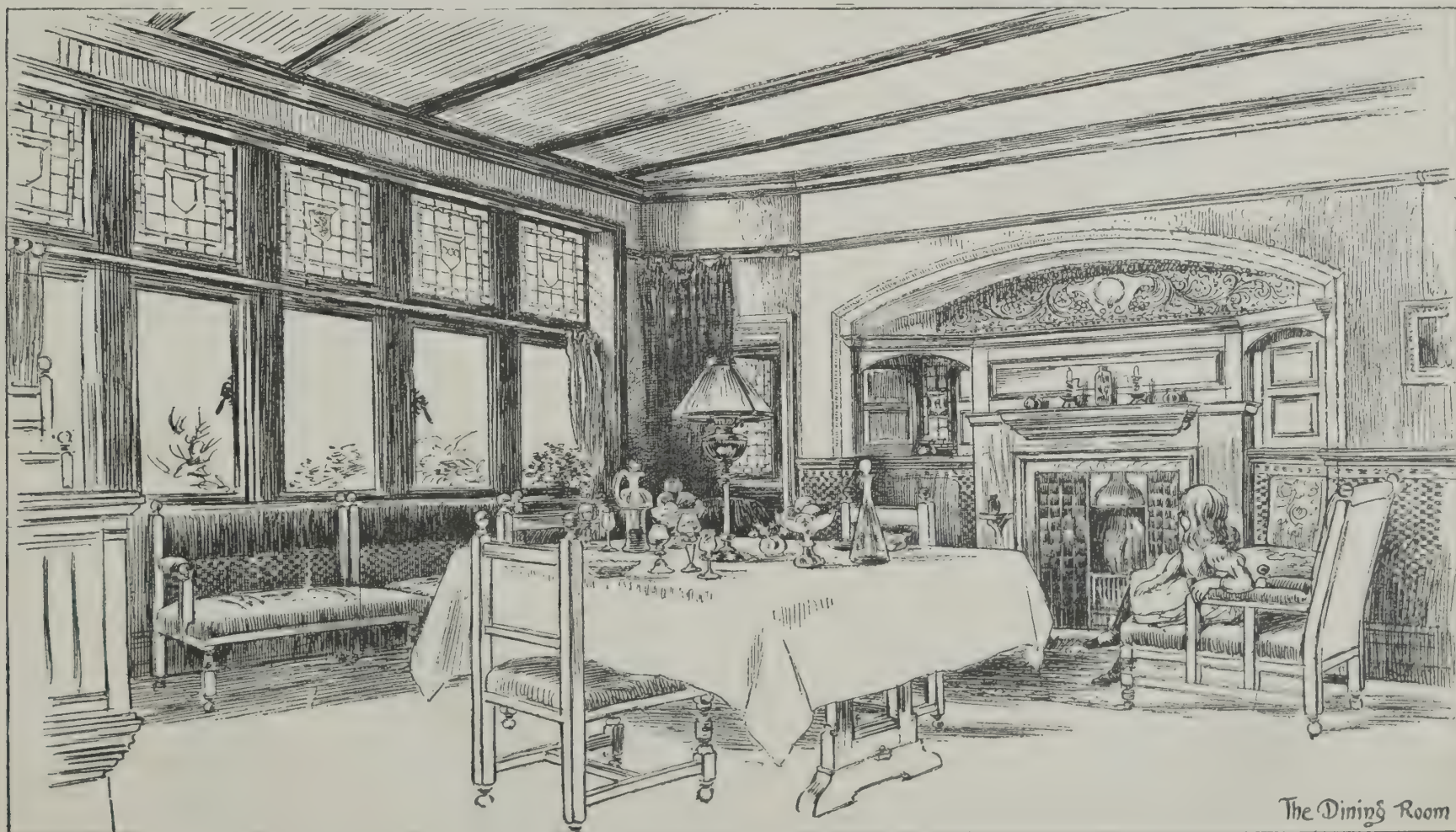
Coming to the floors, pugging—or, as it is called, “deafening”—is used in all the best rooms, and these have also a double floor—a rough deal one and a hard wood finished one, with between them a layer of “all wool Pyramid brand, resin sized, deafening felt,” fixed down by two inches to one-half inch slips, to which the hard wood floor is secret-nailed. The rough floor is described to be fitted carefully around all studs, etc., up to the sheathing, so as to prevent mice circulating. Here is a good clause: “All the plastering is to be finished, cellar cemented, and all mason work done and thoroughly dried through before any of the interior joinery is brought into the building or put in position.” The materials used for doors are required to be thoroughly seasoned and kiln-dried, and on the plans the sizes for both width and height are figured. Sliding doors are much used, while many openings have no doors at all. These would be provided with curtains, which

give the desired privacy. There is no question of “draughts” in an American house, which is warmed equally throughout. All the doors have a hard wood slip three-fourths inch thick, splayed each edge, fixed under them. This enables the door to open clear of carpets, etc. The windows are mostly double hung

sashes, requiring no special description. All are directed to have a burglar-proof fastening. After a description of the stairs most minute directions follow for the fittings of the various pantries and closets upstairs and down. These include clothes closets, linen and china closets, and butler's and kitchen pantries, as well as the various store rooms. Then we get a full description of the refrigerator and ice safe, which consists of two thicknesses of boarding, two inches apart, filled with mineral wool, then an air space of one inch, and a layer of resin-sized waterproof paper, the actual inside being of clean, narrow matched spruce. The lower part is the ice safe or tank, and it is lined with sheet zinc, and the bottom covered with a wood grating to prevent the ice cutting the metal. The doors of these spaces are constructed in precisely the same way, and the joints between door and frame are double rabbeted.

The wood finish is described to be first a certain patent “mineral filling,” and then another “patent transparent wood finish.” The hard wood floors are to be done in the same way, but with a “vegetable” filler. The tinwork is to be painted two coats of metallic paint, and here I may say that this tin—or, to speak more correctly, tinned iron—is used wherever we use lead, and also for the rain water pipes and gutters. Lead is too expensive, and is also more affected by changes of temperature.

PAPER FROM CORN HUSKS.—Corn husks boiled in caustic soda are being utilized for the manufacture of paper. The cooking process results in the formation of a spongy, glutinous paste, which is subjected to heavy pressure so as to eliminate the gluten, the fiber remaining being made into paper in the ordinary way.





## THE WASHINGTON STREET TUNNEL, CHICAGO.

It is impossible to estimate how many people daily cross the branches of the Chicago River, which separate the business portions of the city from the great north and west sides and divide the city into three distinct sections, each having its particular characteristics. It is sufficient to state that the various bridges long ago proved inadequate, and tunnels were built under the river to accommodate the currents of traffic continually passing to and from the north and west divisions. It is stated that 22,000 vessels pass through the Chicago River in the seven months comprising the season of navigation, and the constant swinging of bridges is a hinderance and delay that even the tunnels cannot adequately relieve. The Washington Street tunnel, through which the West Chicago Street Railway Company has the right of way, well illustrates tunnel construction. This tunnel is a little more than 1,525 feet long, and was built in 1869, at a cost of nearly \$600,000. The bed of the river and the top of the masonry of the river portion are the same, and as it allowed a depth of but 14 feet at low water in the river, the top of the masonry was continually being damaged by vessels, and proved an obstruction to the free navigation of the river at low water.

A few years ago the West Chicago Street Railway Company got permission from the City Council to operate its cars through the tunnel, on condition that the level under the river should be lowered so as to have at least 17 feet of water over it at the lowest stage, or 19 feet at mean water, and also that they build a masonry center and end piers over the tunnel to accommodate a swing bridge, the city supplying the superstructure. Mr. S. G. Artingstall, the well known Chicago engineer, was intrusted with the work, and it was completed in the spring of 1890. For the river section one-half of the stream was closed by a cofferdam, the timber crib which was to serve as the foundation for the masonry center pier being used as the head of the cofferdam; when this was pumped dry of water the arch of the old tunnel was taken up and a cover for the tunnel built with steel girders 20 inches deep and 2½ feet centers, with brick arches between the girders in four rings of brick, covered with a layer of asphalt and then with 12 inches in thickness of cement concrete. For the portion under the crib for the center pier, and also under the dock walls or end piers, a three-centered arch, built with five rings of bricks, was adopted. The part under the center pier was built by the usual methods of tunneling under the cofferdam. This part has not only to serve the purpose of a roof over the tunnel, but also is now supporting the masonry center pier and swing bridge. The approaches and all parts of the tunnel at the time were put in thorough repair, the grade of roadway under the river lowered to correspond with the lowering of the roof, and the grade of approach changed.

The West Division Street Railroad Company are now building under the Chicago River, about one-quarter mile south of Washington Street, a tunnel for the exclusive use of their street cable cars. This work is being done under the direction of Mr. Artingstall, who is now chief engineer of the sanitary district of Chicago, and it is expected will be finished in the fall of 1892. The dimensions of the tunnel are very large, as the company are sparing no expense to make it light, airy, and pleasant for their passengers. The tunnel is 30 feet clear width inside by 16 feet high, and besides passing under the river, goes under two seven-story buildings and one five-story building, and also under all the railroad tracks entering the Union Depot. A large portion of this tunnel is built, and the part under the tracks is in process of construction; the tracks have been undermined and supported without interfering with the passage of a single train. The cost of this tunnel will be about \$2,225,000.—*The Graphic*.

## Church Spires.

The origin of the spire, like that of the pointed arch, is merely matter of conjecture. The probability is that it arose out of the peaked roof usually given to campaniles and towers of a preceding period, which form was afterward gradually improved upon and refined, till it eventually grew up into the slender tapering spire. According to such supposition, we would refer to the tower of Thion Church, in Normandy, as an example exhibiting the rudiments of the spire, it being no more than a steep peaked roof or low pyramid, whose height does not exceed three-fourths of its base. A peak of this kind differs also from the spire, both in being the same in plan as the tower on which it is placed and in being immediately set upon it, whereas the spire is almost invariably an octagon or other polygon, and is surrounded at its base with a parapet. In Italy, where campaniles are usually detached square towers of very slender or lofty proportions, the spire is almost unknown, for such towers have seldom more than a mere pyramidal roof or peak, which, though it may be considered as the germ from which the Gothic spire was afterward developed, is in itself of quite different character; yet, at the same time, that of each is best adapted to the respective style. There are some few instances of square spires,

proprietor of the building, after the work is completed. The reply, which is certainly definite enough, is as follows: "The architect is obliged to deliver, to the proprietor who has employed him, the plans of the constructions which have been carried out under his direction, as soon as the work is completed, on the condition, however, that the architect's fees have been fully paid." This view of the law is supported by several decisions in France.—*Amer. Architect*.

## Simplicity in Furnishing and Decorating.

If people could only be guided into simple habits and ideas as regards so-called comforts and ornaments, we should not only be more likely to develop nobler art, but also to secure less toil and trouble in the care and keeping of the useless gimcrackery with which the homes of all, from noble dukes to well-to-do tradespeople, at present abound. As a rule, it may be safely admitted that rooms are too much furnished and that the doors, windows, fireplace, floor, walls and ceiling have too little competent care bestowed upon them. Were the constructive features of a room properly looked after, much furniture and upholstery would be as needless as it is troublesome to keep in order and move about. And this brings up another important point in house furnishing too often forgotten—the

question of dust. Dwellers in town are particularly subject to this all-prevailing evil, an evil arising not altogether from without.

Houses are more or less vibratory, especially where there is heavy street or train traffic in the vicinity, and we have not yet cleared out our stock of smoky flues. So that in addition to paying particular attention to the fitting of doors and windows, we would urge the selection of only such furniture as may be easily moved about, or so raised above the ground as to leave at least 9 inches clear space underneath. Avoid useless side tables and cabinets, which are so often dragged in for no other purpose in the world but to carry "art emporium" rubbish. Remember that all furniture beyond what is really necessary for comfort and convenience only provides so many more traps where-with to catch the dust. Avoid all woolen and fluffy stuff in such upholstery as it may be deemed necessary to have. These two or three simple hints can be acted upon by nearly everybody. To those whose means admit it, we would suggest the use of thin parquet over old floors; upon such a floor only one or two rugs, in lieu of the usual carpet, would be needed, which should be of a close, hard texture. Then we would substitute the grand and

semi-grand piano for the dust-attracting cottage instrument where possible, and abolish forever the hideous practice of covering our furniture with all kinds of drapery and frippery.

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THE WASHINGTON STREET TUNNEL CHICAGO.

among them a very singular one at Egel, in Germany, where two such spires are set immediately together upon the same tower. But however slender in their proportions such spires may otherwise be, they have a certain heavy massiveness of form. When, therefore, greater loftiness and lightness were aimed at in this feature, the adoption of a polygonal plan for it became almost matter of course; for although, in a geometrical drawing, the general outline and proportions of a spire are the same, whether it be square or octangular in plan, the perspective or actual appearance is widely different; because, in the latter case, the diagonal breadth of the square tower below is cut off, and each side or plane of which the spire is composed becomes a much more pointed triangle. Besides which, the polygonal spire produces a degree of contrast and variety highly favorable to general effect in the pointed style.

## Ownership of Plans.

The question of the ownership of plans, under French law, is brought up, and very clearly answered, in *La Semaine des Constructeurs* for Oct. 3, 1891. A correspondent asks the "Committee on Jurisprudence" of that journal, which is composed of persons thoroughly acquainted with the subject, whether an architect is bound to deliver the plans of a building to the



## Utility and Art.

That theory which would base architectural beauty upon utility and fitness is so far from being satisfactory as clearly tracing the source of the former quality to the two latter, that, instead of removing perplexity, it rather increases it. In direct opposition to such doctrine, everyday experience convinces us that, so very far from constituting æsthetic beauty, mere utility and fitness contribute very little at all toward it, even in architecture, where, as far as the purpose of building is concerned, they might seem to be not only indispensable but all sufficient, and afford all the pleasure which the mind can derive from examining and contemplating edifices of any kind. Yet such is assuredly not the case; on the contrary, it is only when it aims at something more than utility, when it indulges in the superfluous or the useless, in short, when it steps into the province of art and aims at the idle gratification of the eye, that architecture is entitled to the high distinction claimed for it and the lofty pretensions set up in its behalf. Upon the utility principle of beauty a turnip field would be a far more agreeable prospect than any to be met with in Swiss or Italian scenery; and upon the common sense fitness and utility principle, a church erected according to the Islington or Bethnal Green taste ought to delight quite as much as, if not more than, any of those glorious examples of our ancient ecclesiastical architecture which so wonderfully impress the mind. Unless the word "utility" be exceedingly elastic indeed, and its meaning so ductile that it may be drawn out like gold to a most prodigious extent, utility cannot at all be said to recommend the dome of St. Paul's, it adding nothing whatever to the serviceableness of the building; while on the other hand, the unsightly platforms or galleries with which churches used to be encumbered ought to be accounted beautiful, since they certainly had the plea of being useful as far as affording sittings goes.

## AN IMPROVED DOOR HANGER.

We illustrate herewith a new sliding door hanger, manufactured by the Munger-Colton Mfg. Co., of Chicago. The principal objects aimed at by the manufacturers, with this hanger, are to reduce to a minimum the space between the studding, thus securing more space in the rooms, and also to bring the soffits much closer together than has been possible heretofore, thereby doing away with a wide unsightly opening overhead. By the peculiar construction of the "Colton" hangers, these objects have been attained, a space of one-fourth inch only being required between the soffits.

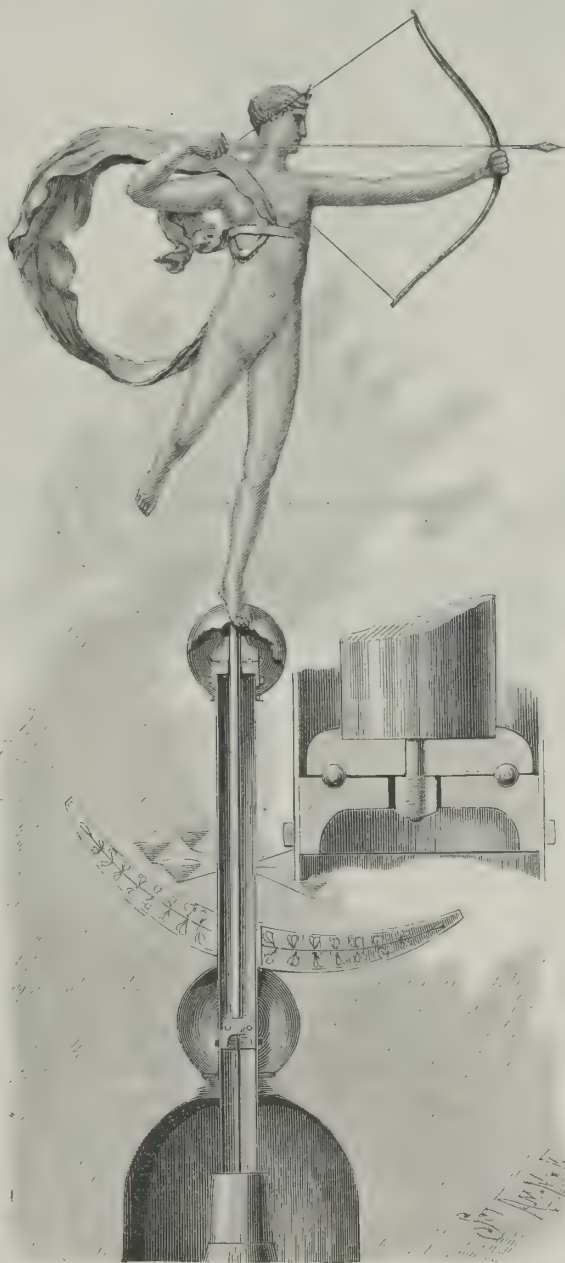
One figure represents a side view of the hangers with parts of the door and track broken away, also with one wheel taken from the back hanger, to show the construction. The working parts are made of steel and the hangers are so constructed as to adapt the wheels to unequal elevations of track, or to allow the wheels to pass over obstructions upon the tracks. The wheels are upon independent axles, and it is stated that a variation of nearly two inches in the height of the tracks will not interfere with the perfect working of the hangers, as there is no side motion. The parts being of steel, the space between the studding is reduced to a minimum, and the space between the soffits can be reduced to one-fourth inch. The other figure shows an end view of the hanger upon the track, the dotted lines representing the possibilities of variation of the hangers, to conform to a similar variation in the elevation of the tracks. A sheet of directions, being an architect's drawing in detail, showing every part full size, is packed with each set, and will be mailed to any one upon application. Another novel and useful feature is the packing of the necessary screws in separate enve-

lopes, duly labeled for each part, thus saving time to the merchant and builder, and securing the use of screws of proper size.

Messrs. H. H. & C. L. Munger, 142 Lake Street, Chicago, are the general agents for this hanger.

## THE MADISON SQUARE GARDEN WEATHER VANE, THE HUNTRESS DIANA.

The tower of the new Madison Square Garden, of this city, has recently been completed, and has been



surmounted by the great weather vane representing the huntress Diana discharging an arrow in the direction whence the wind is coming. On account of its elevated position and high artistic character the colossal statue, for such the weather vane really is, has attracted much attention. The general design is due to Mr. Stanford White, of this city, who was the architect of the building and the tower, and who is the architect of the Washington arch in this city, now approaching completion. The statue proper is the production of the celebrated sculptor, Augustus St. Gaudens. The full sized model was supplied from the artist's studio, and the statue was reproduced in metal by W. H. Mullins, of Salem, Ohio.

The statue, whose general appearance is given very accurately in the cut, is 18 feet in height, and, with its iron frame, armatures, and counterpoising, weighs 1,800 pounds. It is made of 22 ounce copper, struck up in drop presses. The process of manufacture was as follows: Using the statue as a model, a number of plaster of Paris moulds were made to cover, section by section, the entire figure. From each of these moulds a casting was taken, the cavity being filled with melted zinc, thus giving an accurate male die, reproducing every detail and roughness of the original statue. Female dies were made, also of zinc, using the

male dies as a base. The statue was struck up from these dies. A corresponding pair were placed in a drop press and accurately adjusted. Sheet copper, cut to proper size and placed between the dies, was gradually struck up by a succession of blows, with constant annealing between the impacts. In general, the female dies were continually replaced by others of increased depth, a single male die in general answering for each part. A shallow rebate was worked upon some of the edges of the pieces, so as to enable a comparatively flush joint to be made by lapping an unrebrated edge thereon. The whole was then riveted together and finally brazed, so as to produce a water-tight structure.

The frame consists principally of wrought iron pipe. A 7 inch pipe runs up through the central axis of the figure to the head, and to it other pipes, bars and stays of iron are secured, running to and attached to different parts of the figure as required.

The foot of the figure rests upon a hollow ball, 22 inches in diameter; an extension of the central 7 inch pipe runs down a further distance of 9 feet; and this is surrounded by a 10 inch pipe, which extends up a short distance through the bottom of the upper ball. The lower ball is 3 feet 4 inches in diameter.

It is obvious that as the statue turns, the 9 foot section of pipe must also turn, and that the upper ball attached to the figure turns with it. The construction, it will be seen, absolutely excludes all rain from the interior of the 10 inch pipe. The weight of the figure is sustained by two horizontal ball bearings, about 9 feet apart and within the 10 inch pipe and lower ball. Each bearing consists of two annularly grooved flanges, between which a number of 1½ inch steel balls work within the grooves. By adjustment of the relative parts, principally as regards the location of the frame, the center of gravity is brought as nearly as possible to fall upon the axis of the 7 inch pipe. A bolt and nut at the bottom of the rotating pipe holds the figure down to its position, so that it cannot leave the ball bearings. A wind pressure of one-fourth of a pound to the square foot is sufficient to move the statue.

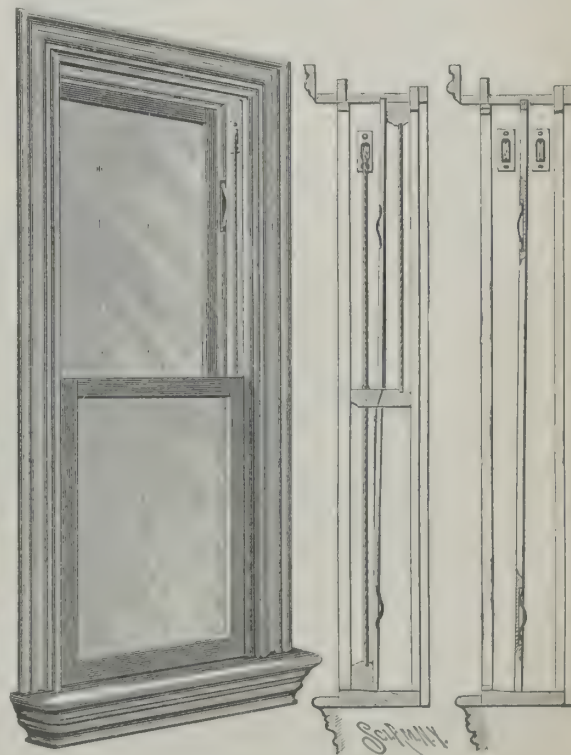
Below the figure is the great crescent, measuring about 12 feet from tip to tip and 22 inches in horizontal depth. This is built upon an angle iron frame. The sides and bottom are closed with plate glass in small panes, and a series of lids close the top. Within the crescent are 66 incandescent lamps, ten of 50 candle power and the rest of 16 candle power each. Immediately above the crescent, ten reflecting lamps are arranged to cast their rays upward upon the figure.

The apex of the figure is 347 feet from the ground. The highest point accessible by fixed ladders is the crescent, 323 feet from the ground.

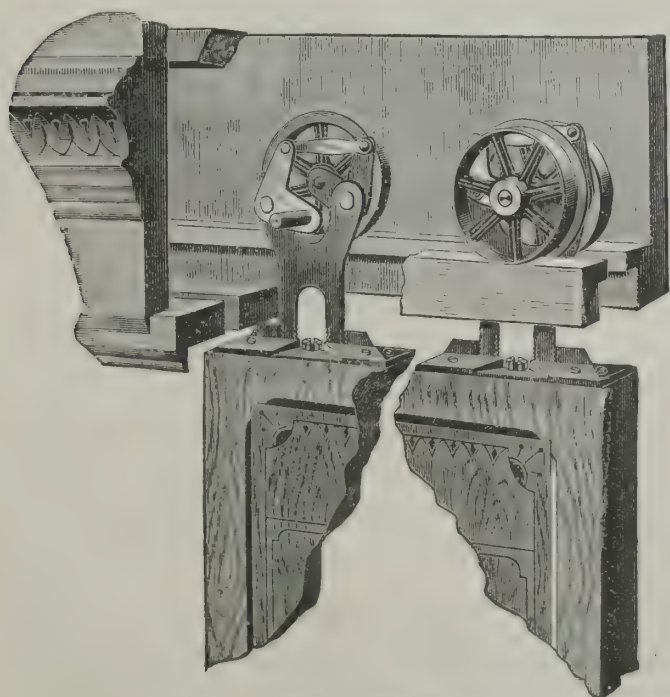
A lightning rod connection with the rotating figure is thus arranged: The upper part of the 10 inch stationary tube is surrounded with a copper ring immediately under the upper ball. From this ring six arms of copper rod extend upward, terminating in points almost in contact with the ball, which latter, it will be remembered, turns with the figure. From the ring the main lightning conductor is carried down to the ground.

## SCHMIDT'S WINDOW FRAME.

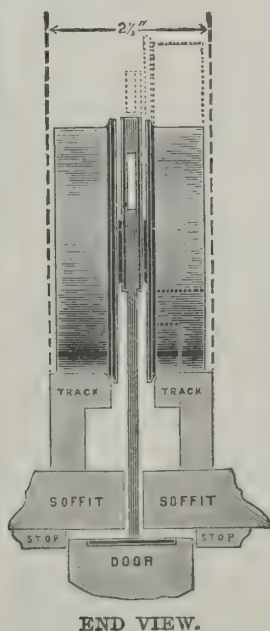
This window frame, the illustration of which appeared in our December number, has a diagonally placed parting rail in the sash slideways, by which the sashes, when closed, are firmly wedged in position to exclude air and prevent rattling, while an upper and a lower spring in the parting rail holds either sash at any special point where it may be left. It is a patented improvement of Mr. August Schmidt, of No. 1768 Amsterdam Avenue, New York City.



SCHMIDT'S WINDOW FRAME.



THE COLTON SLIDING DOOR HANGER.



END VIEW.



**Sackett's Wall and Ceiling Board.**

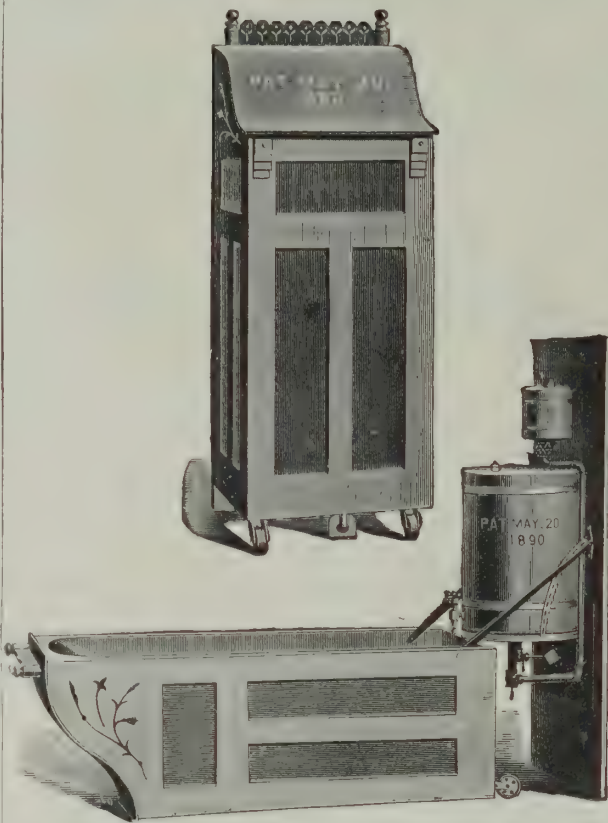
A new building material has just been placed on the market by the Sackett Wall Board Company, 38 Dey Street, New York. This is a fire proof board for walls and ceilings. This board is nailed directly to the studding, and does away with lath and plaster. It will not warp or crack and can be applied by unskilled labor at any time of the year. Rooms finished with it can be occupied at once. As there is no moisture in the material, wood trim may be finished to it at once, without danger of being injured by twisting or swelling. This material is cheaper than lath or plaster. For ceilings of churches, theaters, large dining rooms, halls, and stores it is said to be superior to wood, as it is fire proof, and to plaster, as it will not crack or fall, and admits of any class of decoration. Specimen work may be seen and estimates obtained at the office of the company.

**AN IMPROVED MITERING MACHINE.**

The accompanying illustrations show back and front views of the new No. 3 Universal miter machine made by the Fox Machine Co., of Grand Rapids, Mich. It has all the latest improvements, adjustable stop, universal column, universal squaring gauges, adjustable miter gauge, adjustable bed plates, etc. The carriage is in form of a triangle strongly braced, and, being firmly guided in the upright frame, the knife must make a straight and true cut. The bed plates are placed adjustably in the bed of the machine, and can be elevated at the end next to the knife. This is done to make a slight undercut on the moulding, which always insures a tight joint on top. The miter gauge is made adjustable to and from the knife, a necessary requirement in cutting hard wood or wide mouldings, and is provided with a stop to cut mouldings the exact length. A squaring gauge attachment consists of a central post secured to the bed by dowel pins and thumb screws. At each side of the post is pivoted a gauge, secured the same as the gauge on B trimmers. This gauge can be set at any angle, and always makes a shear cut with the knife. The post can be quickly removed and the miter gauge placed in position to cut miters. Motion on the Nos. 3 and 5 machine is obtained by a foot treadle connected by a rod to the carriage. A tempered steel spring raises the carriage to the top of the stroke. On the Nos. 2 and 4 miter the motion is obtained by a loose pinion and double rack, the same as the trimmer. The treadle rod on the foot power machines is threaded and has adjustable cushioned stops, so that in cutting

**A COMBINATION FOLDING BATH TUB.**

The illustrations represent, in open and closed position, a bathing cabinet, which can be placed in any furnished bed room or other apartment, without detracting from the appearance of the room, while af-

**A COMBINATION FOLDING BATH TUB.**

fording the convenience and luxury of a bath room. The two side hinges that connect the top of tub to the back of heater, in connection with the two rollers on bottom, allow an easy and partially automatic movement. The waste water exhaust is so constructed as to connect and disconnect itself in folding and unfolding the tub. The heater resting on the brackets is made of galvanized iron and has capacity for warming twenty gallons, is arranged so as to let cold water circulate through the same supply to the tub and can be warmed to any temperature desired, using gas, gasoline or oil, and requires but a few minutes to warm

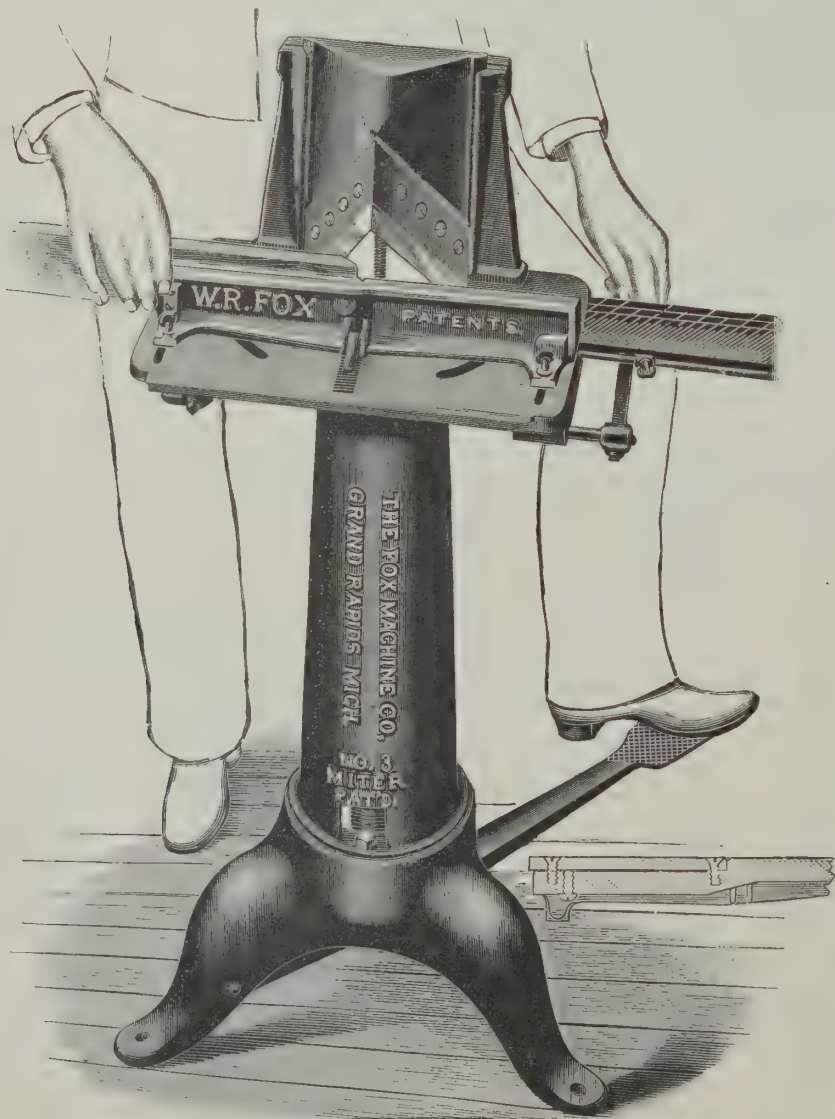
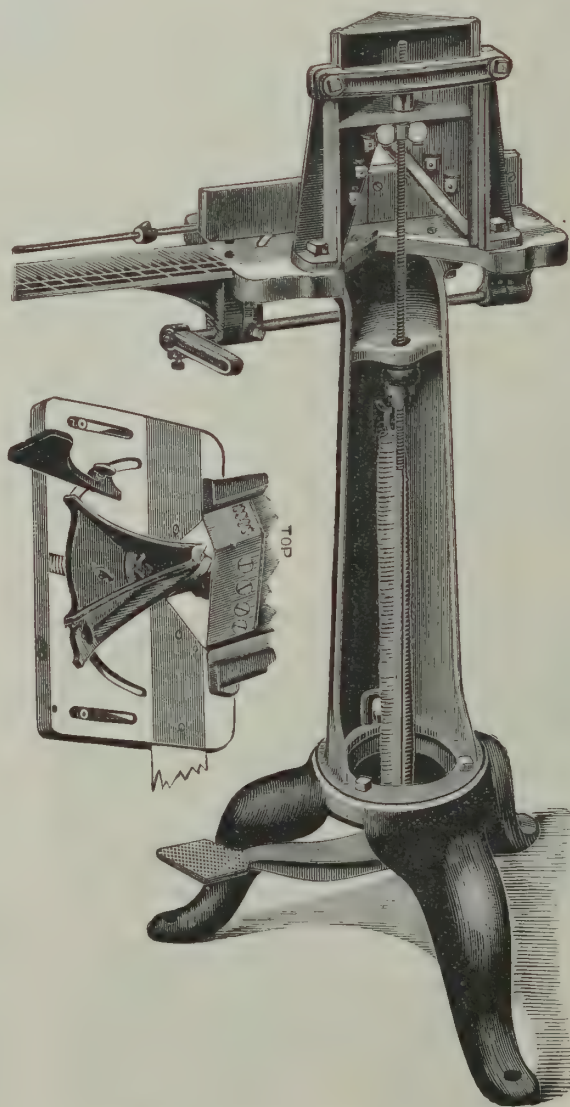
**Japanese Interiors.**

The houses that the Japanese women occupy are, it goes without saying, says *Harper's Magazine*, as neat and wondrously fashioned as themselves; almost always full of surprises, with movable panels, with boxes and slides, with compartments of all shapes, and astonishing little closets.

Everything is scrupulously clean, even among the humblest, and of apparent simplicity, especially among the richest. Alone the altar of ancestors, where sticks of incense burn, is gilded, lacquered and garnished like a pagoda, with vases and lanterns. Everywhere else a purposed bareness—a bareness all the more complete and white if the dwelling pretends to elegance. No embroidered tapestries; sometimes transparent portieres made of string beads and bamboos. And never furniture; it is on the floor or on little lacquer pedestals that necessary objects or vases of flowers are placed. To the mistress of the house luxury consists of the very excess of that cleanliness of which I spoke above, and which is one of the incontestable qualities of the Japanese people. It is everywhere the custom to unshoe before entering a house, and nothing equals the whiteness of those mats upon which one never walks without fine socks with divided toes. The wood-work itself is white, neither painted or varnished, keeping as its sole ornamentation, among women of true taste, the imperceptible vein of the young pine.

THE fire which destroyed one-half of the immense State Asylum for Insane, at Pontiac, Mich., recently, was chiefly remarkable for the fact that, although the flames spread with astonishing rapidity, not one of the several hundred demented female patients who occupied that particular wing of the building sustained the slightest injury. The building had been recently equipped throughout with some very ingeniously devised fire escapes, put up by E. T. Barnum, manufacturer of art wire and iron work, Detroit, Mich., and were covered with wire guards, preventing the patients from throwing themselves over. The same firm has recently been awarded the contract for four steel jail cells, at Kalkaska, Mich. They are made of the best flat steel bars, in lattice shape, and are combined with all the elaborate locks and safeguards known to modern jail science. These steel cells put in an ordinary building constitute as perfect a jail as could be found in the largest prisons.

THE importation of cotton bale ties has now ceased, the article is now wholly made in this country, and the

**FOX PATENT UNIVERSAL MITER MACHINE.****MITER MACHINE—BACK VIEW.**

narrow moulding the carriage can be checked at any point in the upward stroke, making much less motion for the foot. In this machine, the column being made on a swivel, it can be placed to accommodate the workman, no matter in what position he stands.

the water sufficiently for a bath. A sanitary chair bath and a family portable chair bath of admirable design and construction are also afforded by the same manufacturers, the Combination Folding Bath Tub Co., of Marshall, Mich.

prices are lower than ever before known. The cause of the depression in prices is due to overproduction. For the year ending June 30, 1890, the importations of cotton ties amount to nearly 45,000,000 pounds, or enough to bind 4,500,000 bales of cotton.





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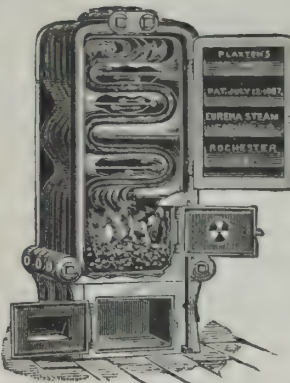
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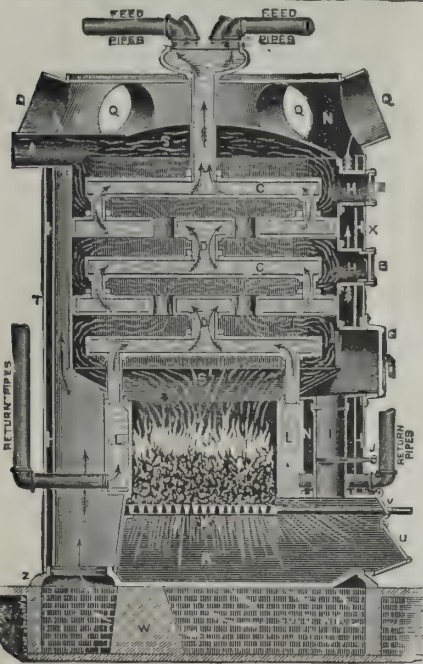
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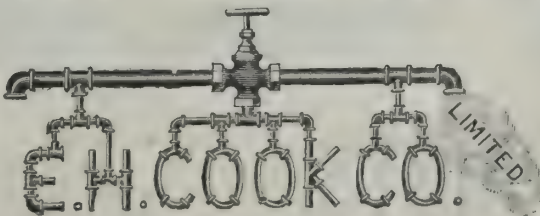
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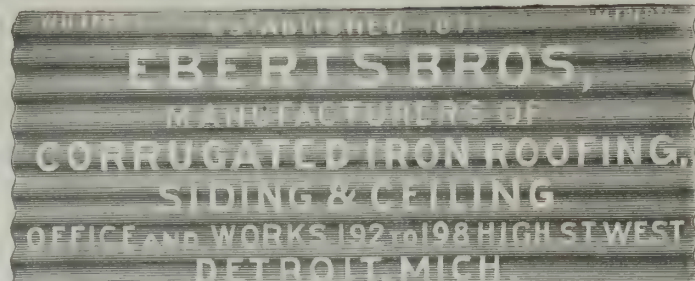
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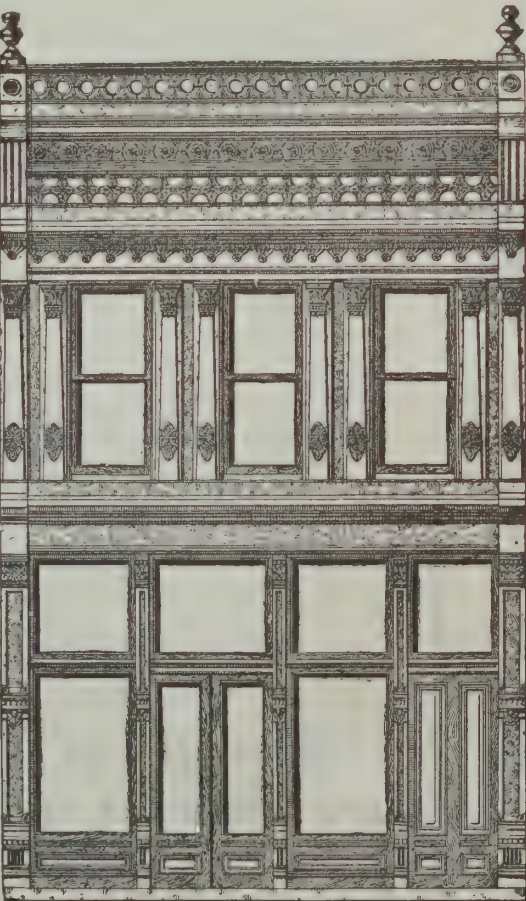
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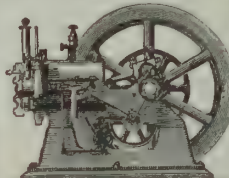
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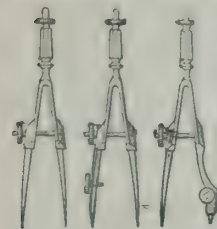
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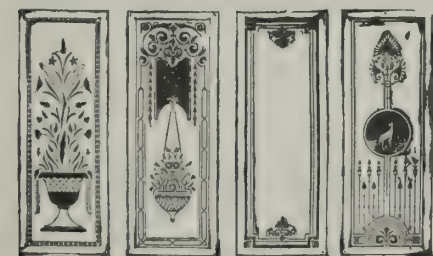
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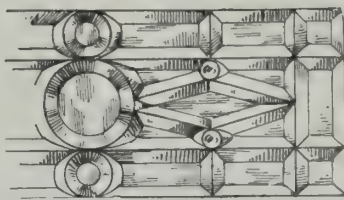
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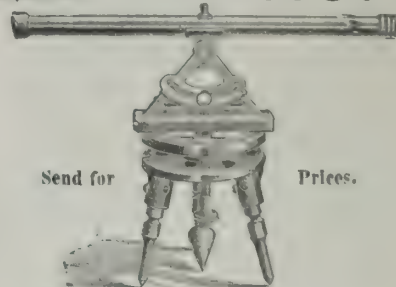
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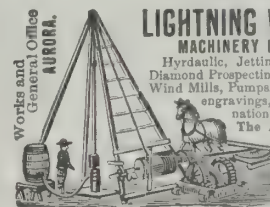
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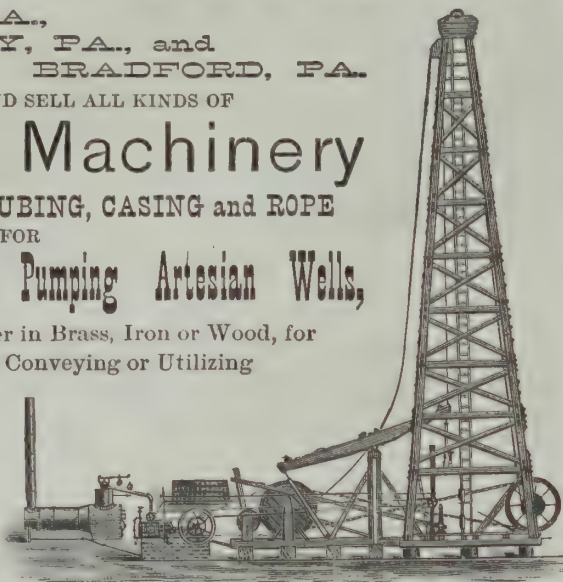
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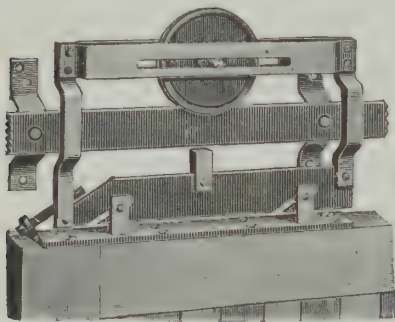
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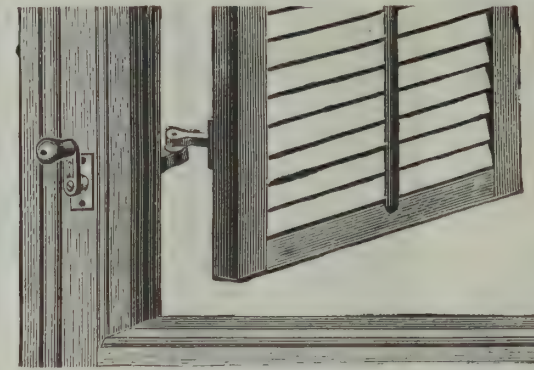
(1) D. R. writes: During the fall my bricklayer laid up a brick wall, or fence, about  $3\frac{1}{2}$  ft. high, 2 ft. thick, on a stone foundation. The brick were set closely in mortar partly composed of Portland cement. This wall was to be used as a retaining wall for ground in front of house, and was plastered on the inside with Portland cement, and packed with ashes (to within four inches of the top of the wall), upon which the ground was placed. No stone coping was used. The frost has now commenced to heave the wall, and the joints are opening, although the mortar was well set and dry before frost. What I wish to know is, is it possible to build a brick wall as a retaining wall with earth behind it and keep the water out of it so that frost will not affect it? And how is it accomplished? A. The wall should have a stone coping, and a foundation of stone  $3\frac{1}{2}$  ft. deep, well rammed. The backing of ashes is of no value. Broken stone would be better. The back lining should be of asphalt, applied hot, or of best Portland cement; no sand. The brick arches of underground street vaults are usually made watertight by means of asphalt.

(2) W. asks: Will whitewood boards shrink lengthwise? For example: A counter is made of two whitewood boards, tightly matched together, and bolted. There is now a crack between them about one-quarter inch wide. Did the boards shrink? A. The soft woods shrink slightly endwise in seasoning.

(3) T. T. E. asks: Will air getting into a small water service pipe prevent the water from flowing through it when the fall is at least 100 feet? The owner of my cottage claims it as a reason for my water supply stopping. I say I think if there was more air, that we should get more water. The water is caught from the spring in a large barrel and then conveyed through half-inch lead pipes to several cottages, then in small tanks with an overflow pipe. I am on the highest ground and am the first to be shut off. A. Air in the pipe is probably not your trouble. The supply pipe from the barrel is too small, so that when the water is running in the lower house tanks, it weakens the pressure at your house, and stops the flow.

(4) E. P. G. says: Kindly inform me through the inquiries column in your paper what is the cheapest way of dressing the surface of a grindstone which has worn unevenly, to produce an even and true surface again? It is not valuable enough to warrant purchasing a diamond tool, and I am not in or near a town where such a tool is owned, the use of which could be hired for this one occasion. A. Nail or fasten a block of wood across the frame as close as possible to the stone; use a piece of  $\frac{3}{4}$  or 1 inch gas pipe, with the end resting on the block, and the edge against the stone; by rolling the gas pipe back and forth along the face of the stone, it can be turned off true. Use no water.

(Continued on page vi.)



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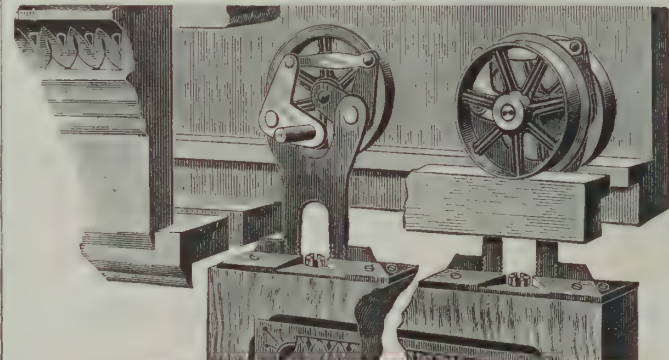
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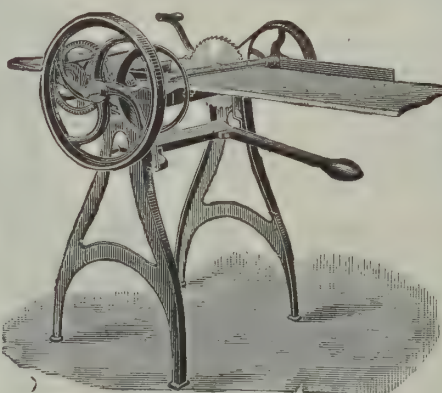


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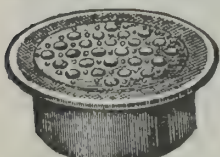
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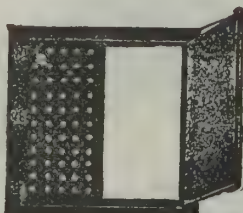
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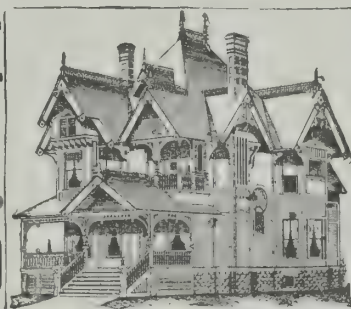
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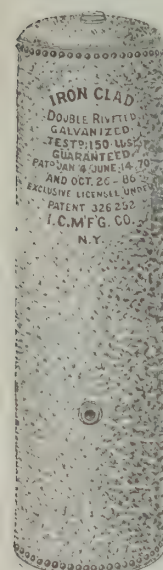
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(Continued from page iv.)

(5) A. U. asks: Will you be kind enough  
to inform me how to prepare barrels in order to keep  
spirits put in them perfectly white? I have a very fine  
well of water 72 ft. deep, 8 ft. square; the sand coming  
in with the stream of water gives me a great deal of  
trouble. Could you advise me how to overcome it? A.  
The method of preparing barrels for pure spirits, as  
practiced by our rectifiers, is to steam the barrels by  
placing them bung down over a small steam pipe pro-  
jecting into the barrel. Continue this for an hour or  
more, according to the condition of the barrel. Then  
fill the barrel with clean water in which a half pound  
of sal soda is dissolved. Soak for two or three hours  
and thoroughly wash out with fresh water.—The only  
remedy for sand coming into your well that can be ap-  
plied easily is to drive several pipes of large size, made  
like the points of drive well pipes, down to a lower  
stratum, leaving their tops below the low water surface.  
This will relieve the pressure that lifts the sand, and  
tend to increase the flow of the well.

(6) M. O. B. asks: After a fire stream of  
water has reached its natural height, how much higher  
can it be forced by steam fire engine, or in case the noz-  
zle of hose be brought one hundred feet higher than  
the water's level, will that be any advantage in forcing  
water higher than when hose is connected with steam  
fire engine at base of building? Give the difference  
between the nozzle being one hundred feet high and  
nozzle placed at base of building. A. With 70 lb. fire  
pump pressure, you can throw a three-quarter stream  
a little over one hundred feet high, while the hydro-  
static height due to the above pressure is one hundred  
and sixty-one feet, so that you could with the hose ex-  
tended to that height still throw a stream thirty or forty  
feet higher, the friction of the hose making the differ-  
ence between the hydrostatic height and the jet height.

(7) W. H. W. asks: Will you please in-  
form me through your valuable paper the best way to  
harden and temper circular saws, the same as the sam-  
ples inclosed and larger, say up to 1 1/4 inches, and  
oblige constant reader? The way I harden them is be-  
tween two cast iron plates with a little oil on the sur-  
face, and temper them on a hollow spindle with the  
end turned down so as to fit the hole in the saws; in-  
side of the spindle is a gas flame, and as the color be-  
gins to come on the saws I keep turning them until the  
required color is obtained, then I lay them on a flat  
plate with a little oil on it. Even when I get them flat  
in hardening, they will go out of true in tempering,  
same as the samples inclosed. One of them is true  
enough, but the other is very much out. By answering  
the above you oblige a constant reader. A. In harden-  
ing, the saws should be carefully dipped plumb edge-  
wise. If they draw or warp, use a smooth hard ham-  
mer on a hard steel block or anvil. Carefully hammer  
the parts that draw so as to make the saw flat. If the  
center bulges, hammer around the edges. If the edges  
warp, hammer the center to relieve the strain. The  
saws will bear the hammering after drawing the tem-  
per.

(Continued on page viii.)

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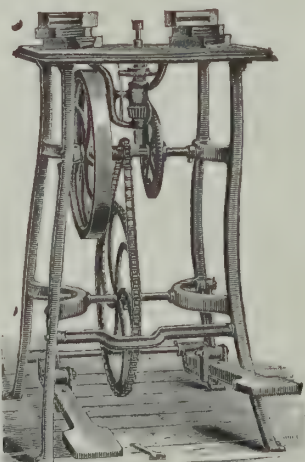
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(Continued from page vi.)

(8) D. A. W. asks: Will it materially weaken the strength or holding capacity of a bolt to have a shallow groove cut lengthwise along the bolt through the threads? If so, how much? A. It does not weaken the pulling stress of the bolt if the groove is not cut below the bottom of the thread. The torsional strength will be slightly weakened, i. e., the nut would twist and blind the thread by tightening the nut too much.

(9) G. D. says: In running an inch pipe about 500 feet from a well upon a hill to supply a house and barn with water, to reach house under about 30 feet water pressure, and to be used for culinary and all house purposes, which kind of pipe is best—lead or ordinary wrought iron gas pipe, or the latter galvanized or tarred? Is the tar coating of the pipe durable? It would seem to avoid the rust of iron pipe, and the possible deleterious effects of the zinc salts from galvanized iron. Would the brass of ordinary globe valves cause salts to be formed, either from the brass or from other metals in contact with it, that would be injurious to health? A. Lead and galvanized iron pipe are the best for conveying water for household purposes. Both are perfectly safe if the water is kept running, or the contents of the pipe entirely drawn off after standing in the pipe overnight. The tarred pipe flavors the water for some time and the tar is not durable upon the inside of the pipe. Brass valves do not affect the water to any perceptible extent. The most approved management for a house and barn supply is to keep a small stream constantly running into a watering trough at the barn, with an overflow to an underground drain.

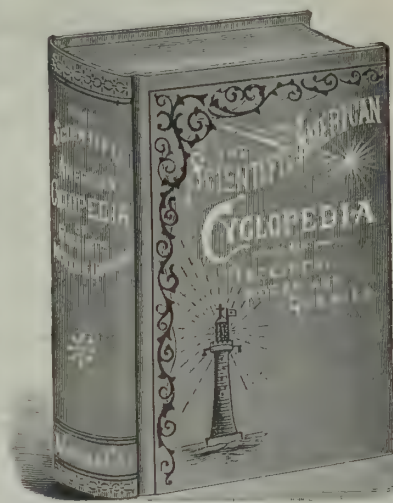
(10) S. A. U. says: A, B and C argue on the principles governing the flow in artesian wells. A says that the water from a well will rise as high as the surface of the body of water that furnishes the supply for the artesian well basin if there are no other outlets, B, that it will rise less, owing to gravity and friction. C claims it will rise to a higher point, on account of a small outlet to the great pressure of a large body of water. To illustrate, A says, take a barrel filled with water and attach a hose to a hole in the bottom of the barrel, raise the hose outside of the barrel, and the water will stand as high in the hose as the surface of the water in barrel. B says it will stand lower in the hose, owing to gravity and friction, and C claims the water will rise to a higher point in the hose on account of the great pressure from the large body of water in the barrel. A contends that it is according to the law of gravitation that water will seek its level, that friction does not exist, as the question is, how high the water will rise, not flow, that the surface of two bodies of water connected below the surface will rise to the same level, regardless of their comparative bulk, and if C's position was correct, then was perpetual motion discovered. Who is correct? A. A is correct every time. B would be correct, if the water was discharging at a lower point than the original head, when gravity would make it flow, and friction would retard the flow. C can take lessons from A.

(11) E. H. says: My radiating steam coil showed some new feature—new to me. Having occasion to open valve under supply tank, the steam with condensed water, instead of blowing out, went direct back into boiler, making a roaring noise. There was 5 pounds pressure at the time. Can you explain? A. Your boiler had a partial vacuum instead of a pressure of 5 pounds. Your gauge must have been out of order. Boilers used for low pressure heating with a closed return circulation often have a vacuum when the steam goes down, because the condensation is greater than the supply from the boiler. 2. An inch pipe set vertically, filled with water, will give how much pressure at bottom, height 60 feet? A. The pressure at bottom of pipe will be 25.8 pounds per square inch.

(12) W. E. S. says: Three men are to lift a timber 18 feet long, weighing 200 pounds, and each to sustain one-third the weight. One to lift from the end and the two others to support their end by means of a cross bar. How far from the end must the two men place the cross bar to bear two-thirds the weight? A. The cross bar should be placed  $4\frac{1}{2}$  feet from the end of the timber for three men to carry it with even load.

(Continued on page xii.)

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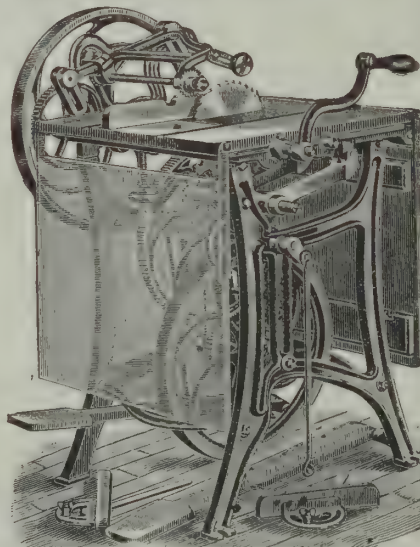
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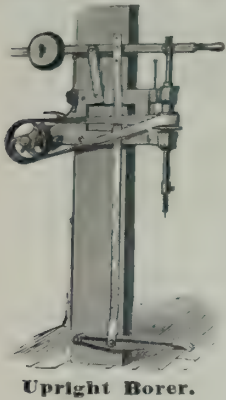
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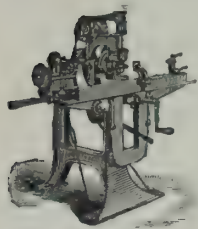
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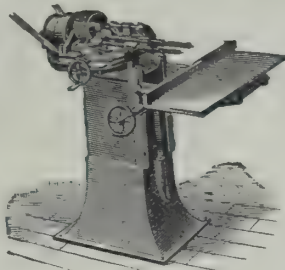


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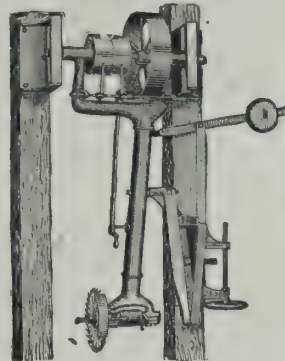


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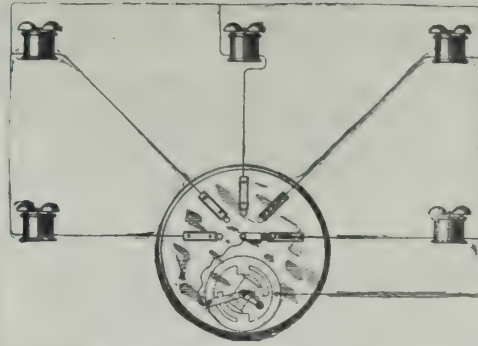


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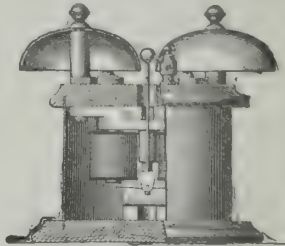


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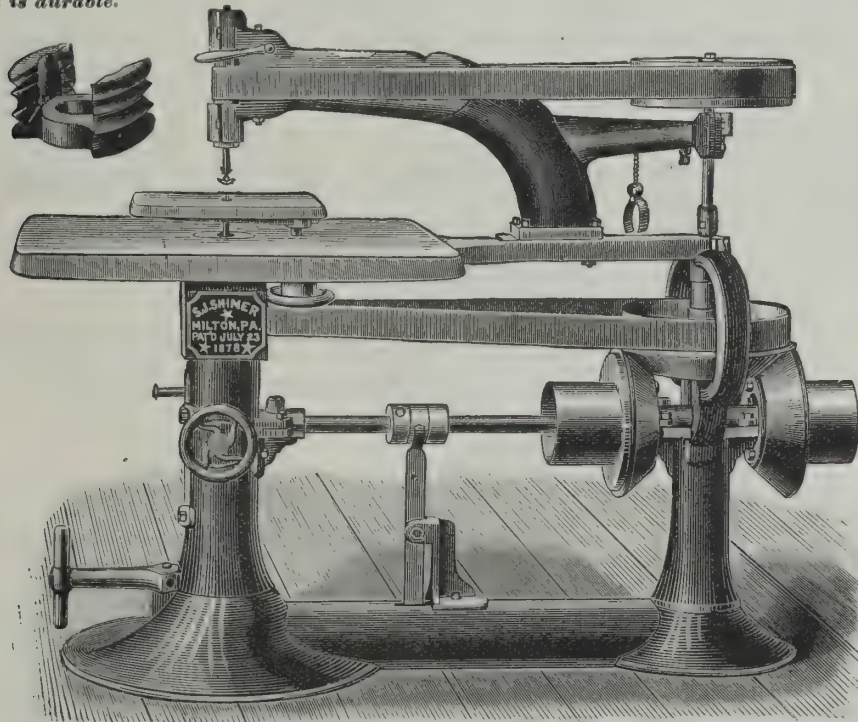


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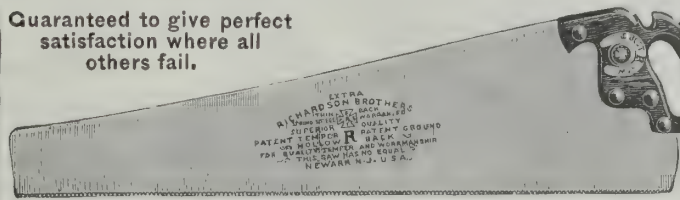
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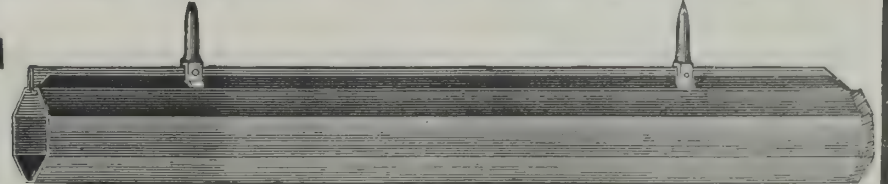
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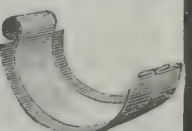
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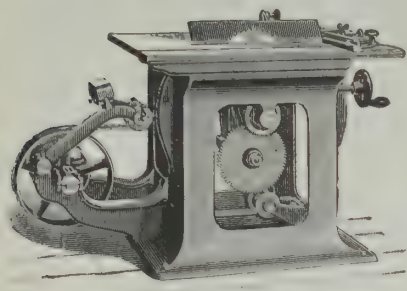


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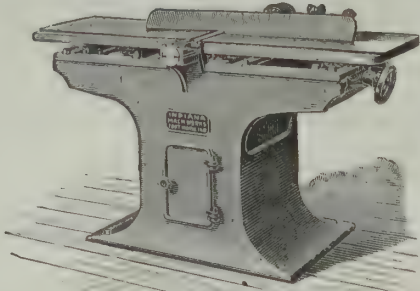




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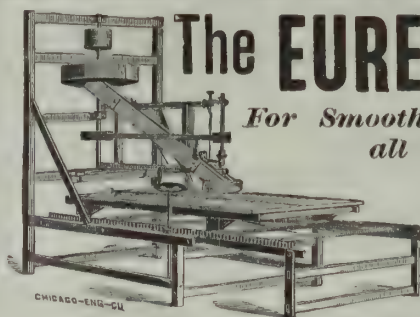
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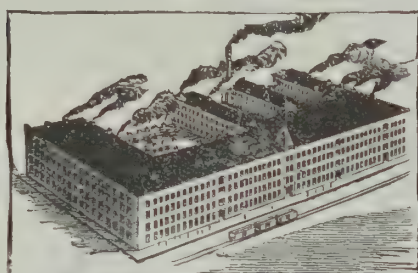
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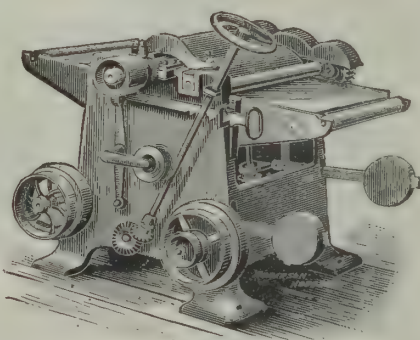
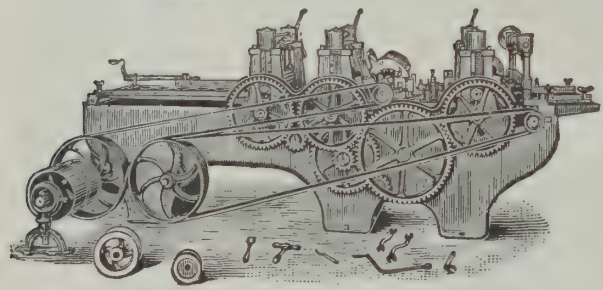
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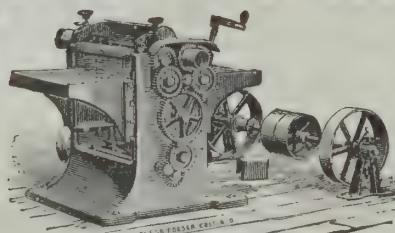
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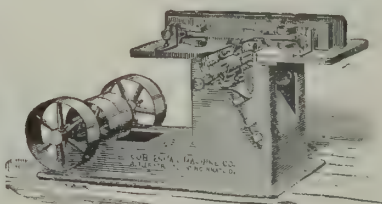


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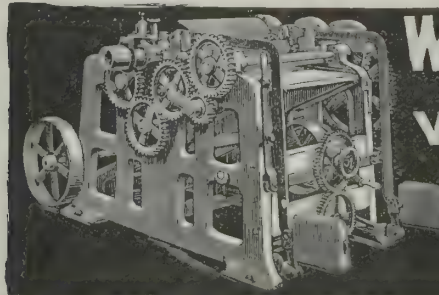
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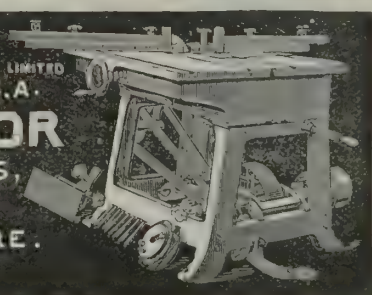
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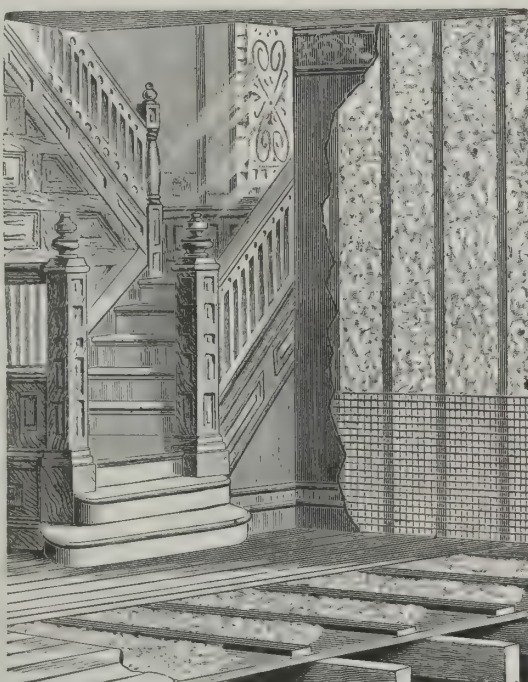
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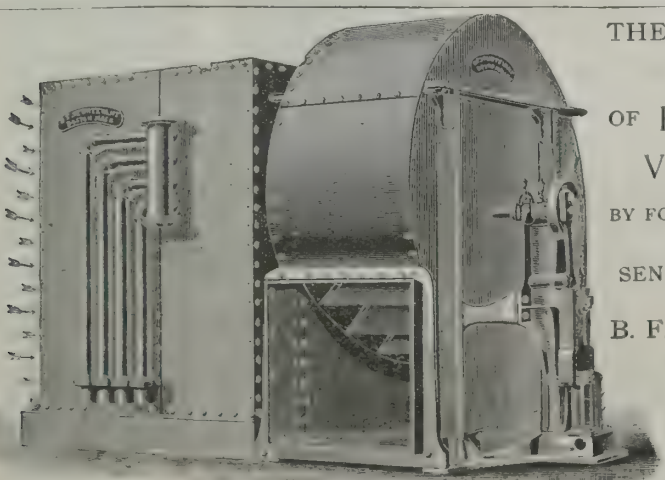
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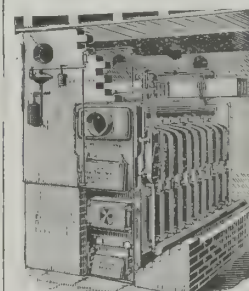
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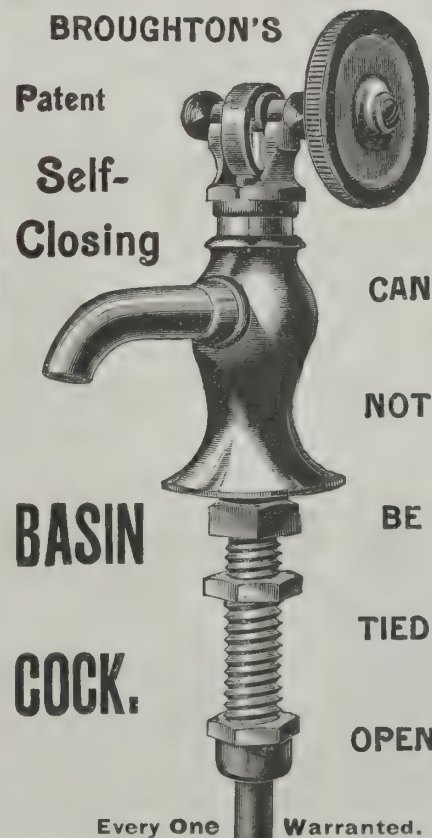


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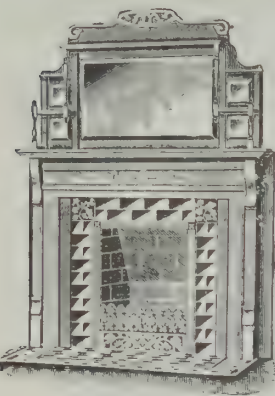
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(Continued from page viii)

(13) T. T. asks: Can you inform me how to clean the slime and filth from a waste pipe that carries off soapy water from a wash sink? It is 1½ inch iron gas pipe and cannot be got at, only at the inlet and outlet. Is there a chemical that will do the work? A. If the pipe is entirely closed, there is no chemical that will open it, but if there is still an opening through it, a hot solution of lye poured into the pipe may clear it out. This preparation comes in pound packages and can be bought at any grocery. If the pipe is closed, and you could work a wire through so as to run in the lye, it might do the business. True caustic potash is far superior to the "lye," sold in the groceries. The name "caustic potash" is often printed on the labels of packages of caustic soda. You must get the real potash at the drug stores.

(14) F. G. B. asks: Will you please tell in your answers to correspondents of a simple method for determining whether water from a driven well is fit for drinking and cooking purposes, and can be used in a steam boiler to run an engine without injury to the boiler? A. There is no simple way. If the water is placed in a glass and some white sugar is dropped into it and all is left at rest, the appearance of a colored

deposit near the little pile of sugar is supposed to indicate a bad water. But the water can be bad without this happening. For boilers the addition of three volumes of alcohol should produce no precipitate (calcium sulphate), and on boiling no precipitate should appear (carbonates). These tests are also far from complete.

(15) C. E. W. says: The water in our recently finished cistern is hard and, of course, tastes of the cement. Can you, through your valuable paper, tell me what will make the water soft, and also what will destroy the taste of the cement? A. As to the water now in the cistern, nothing can be done to destroy the taste of the cement or make the water soft. Empty the cistern of its present supply and the water hereafter will be but little, if any, affected by the cement.

(16) M. J. H. asks: What is the comparative cost of tin, galvanized iron and copper for gutters, and what is the comparative durability of each? Will they last longer if painted? A. The cost increases in the order named. Copper gutters will outlast tin or galvanized iron many times. All will last longer by being painted every two years. The comparative cost will depend on the thickness of the metal.

(17) I. J. M., Syracuse, says: In one of the streets in this city is laid a water pipe 6 inches in diameter, with a pressure of 25 pounds; there are five plugs 400 feet apart with 2½ inch discharge gates. Engine No. 1 takes one takes one plug and goes pumping water. Engine No. 2 takes the plug 400 feet nearer the fountain head and also goes to pumping water. There is but water enough for one engine when the pipe is open. There is an elevation of 10 feet between each engine. A claims that engine No. 2 will get the most water if the couplings from engine to plug are right and don't draw air. B claims that engine No. 1, which is 10 feet lower, will get the most water. Which is right? The water pipe is 5½ feet in the ground. A. Both engines will get water according to their ability to produce a vacuum in their suction pipe. The flow of water will also increase in the main equal to the additional head produced by the suction of both engines. The probability is, with the ordinary hydrant connection at the side of the main, that engine No. 2, next the source of supply, will get the most water.

(18) J. M. asks the different speeds a wood-turning lathe ought to run to turn the following work: a column 8 in. diameter, wheel 3 ft. diameter and a small job 1 in. diameter. A. Base all calculations on a peripheral speed of 500 ft. per minute. This is as much as the tool will stand. For the three cases cited this would give speeds of 240, 55, and 1,920 revolutions per minute approximately.



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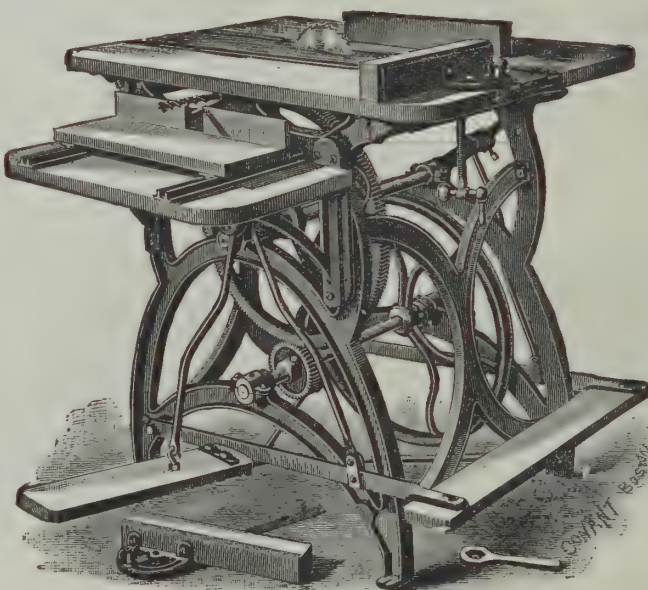
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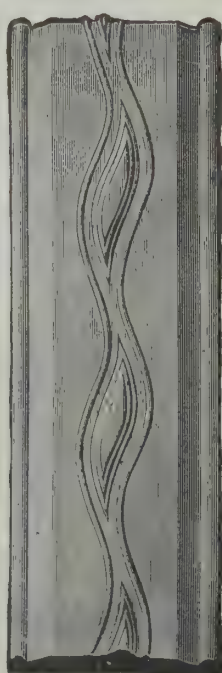
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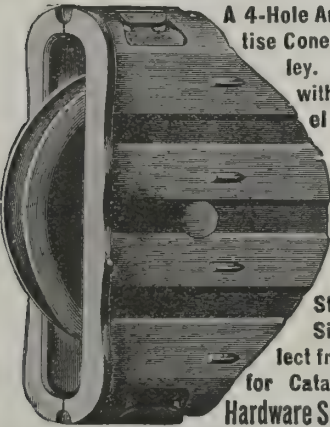
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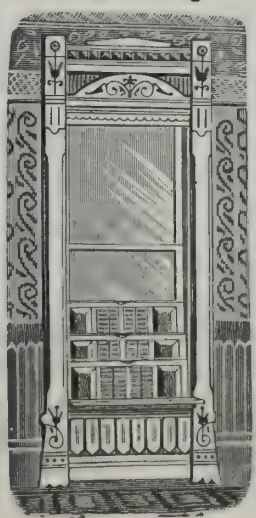
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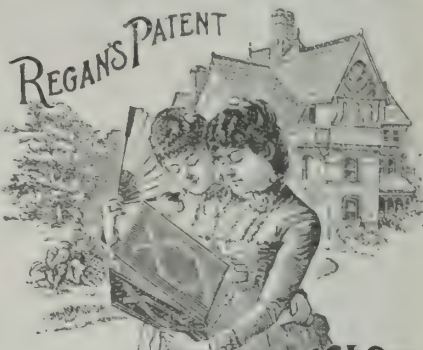
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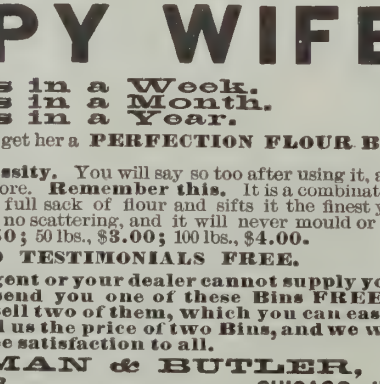
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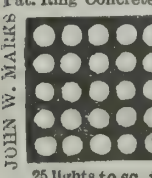
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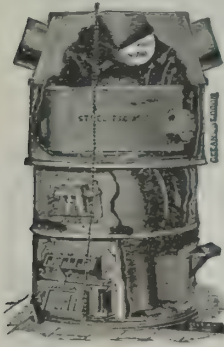


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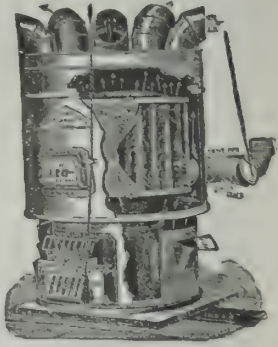




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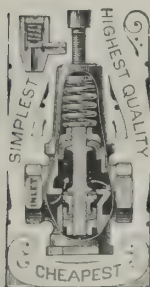
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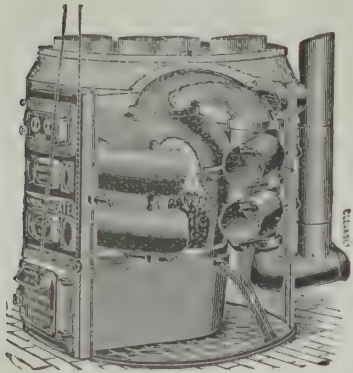
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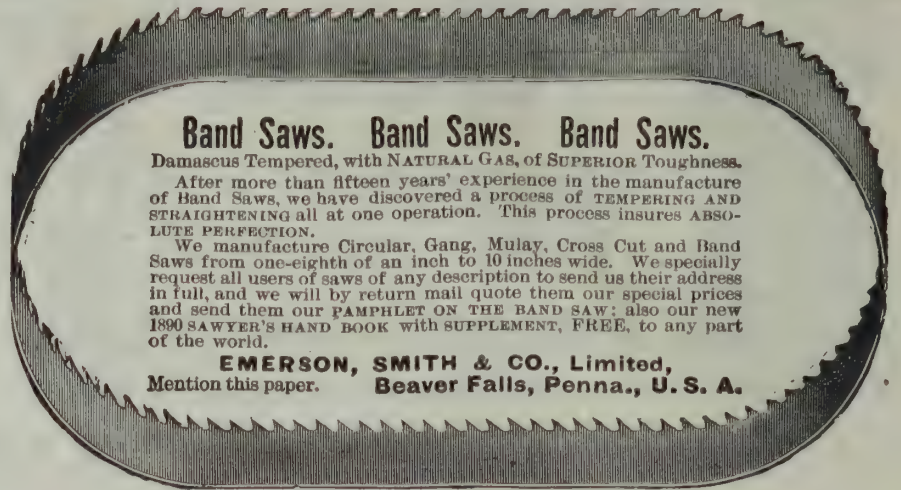
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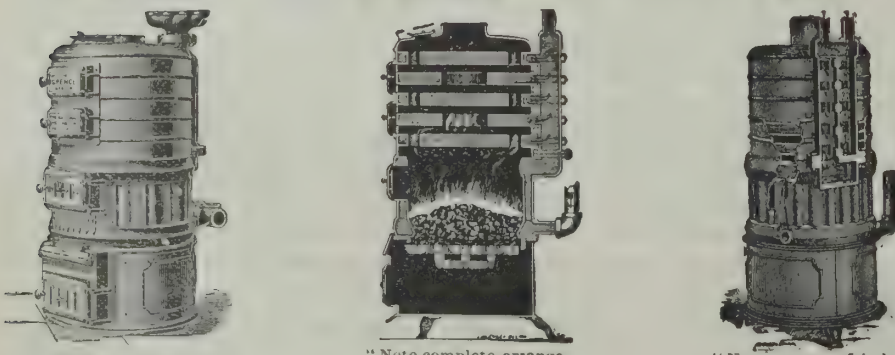
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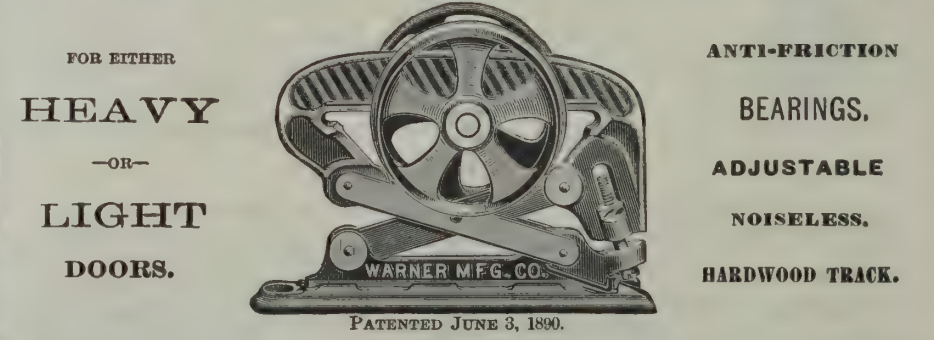
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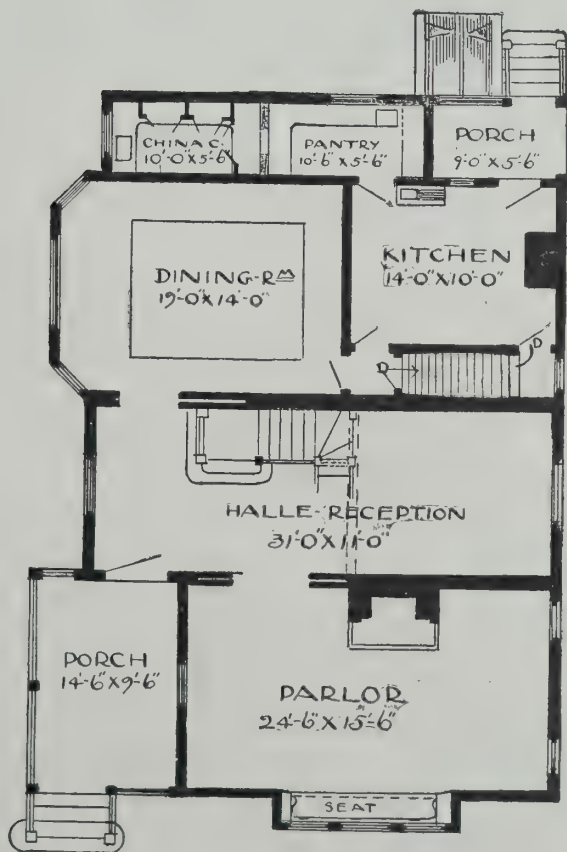
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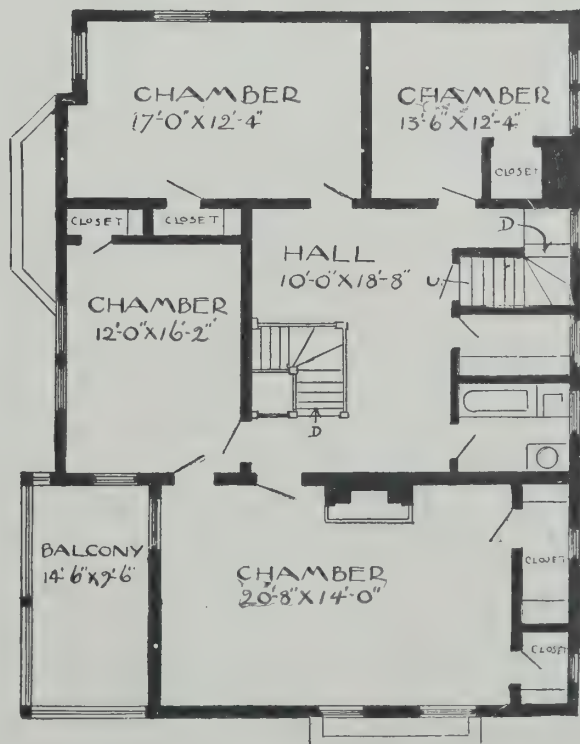
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No. 3.



FIRST FLOOR PLAN.



SECOND FLOOR PLAN.

A RESIDENCE AT CLEVELAND, O.

[See page 34.]





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THE

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### A RESIDENCE AT CLEVELAND, O.

We give on page 33 a perspective and floor plans of the residence of F. J. Haines, Esq., at Cleveland, O., C. F. Schweinforth architect, same place. This comfortable and well arranged house it is estimated can be built for about \$6,000. We are indebted for the engravings to the *Architectural Era*.

### A COTTAGE FOR \$1,500.

One of our colored plates this month illustrates the residence of Mr. John Milstead, Richmond, Mo., recently erected. The foundation is stone. Cellar, under the rear of the house, is 6 ft. in the clear. Except to the ash pit, the rest is not excavated. The exterior of the building is covered with  $\frac{3}{8}$  in. drop siding, the gables shingled. A porch, with round corners, extends around the vestibule, and a quarter circle hood covers the side entrance. The tower is a unique feature of the building. All windows are glazed with D. S. A. glass, except the vestibule window, which has the upper sash glazed ornamentally with cathedral glass, and the attic windows, which are marginal cathedral. Height of main story, 10 ft. in the clear. All the rooms have a neat moulded casing, with head or corner blocks and plinths, and all, except the kitchen, have a moulded base. Kitchen wainscoted 2 ft. 8 in. high, with a moulding cap. Parlor finish is red gum; all other rooms have Southern pine finish, all being finished in the natural. Principal rooms have picture moulds. Front door is a special design; all others 5 pan. P. G. No. 1. Library has a grate, with hard wood mantel and bevel plate mirror. All window and door hardware is bronze. Cost, about \$1,500. L. P. Garrett & Co. contractors; J. E. Cowdery architect.

Our plate was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

### A COTTAGE AT SEASIDE PARK.

One of our colored plates this month illustrates the cottage of Mr. F. S. Andrews, at Seaside Park, Bridgeport, Conn. The design is treated in the Queen Anne style, and contains pleasing features. A spacious piazza extends across the front and returns at either side. The underpinning is built of rock-faced bluestone, laid in black mortar; the building above is of wood, with the exterior framework sheathed, shingled, and left to weather finish, with trimmings painted dark olive green. Roof shingled and painted red. Dimensions: Front, 40 ft. 6 in.; side, 49 ft. 6 in., exclusive of piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 8 ft. 6 in.; third, 8 ft. The lobby contains a coal closet. The panels in the inside entrance door are filled with spindles. The hall, unique, is trimmed with antique oak, and highly polished. The staircase is an artistic one, the posts of which extend to ceiling. Between these posts are turned spindles, which form a screen, thus separating staircase from hall. This staircase is lighted effectively with a large stained glass window, which also sheds a pleasant light over both halls. The nook in hall, with seats, and spindle work, is a very pretty feature; it is built of antique oak, and contains a large open fireplace, built of brick, with arch turned with red sandstone. The floor is of oak, laid in narrow widths, and the ceilings have a hard wood cornice. The rest of the interior is trimmed with whitewood. Parlor and library are stained and finished in cherry, and each have open fireplaces, furnished with tiled hearths and hard wood mantels; the library also contains a window seat. Dining room, good sized and well lighted, contains a similar fireplace. Kitchen and its apartments are wainscoted and fitted up replete. There are five bed rooms, bath room, and many large closets on second floor, and one bed room, billiard room, and trunk room on third floor. Bath room is wainscoted and furnished in the usual manner. Cemented cellar contains laundry, furnace, and other necessary apartments. Cost \$7,000 complete, including furnace, range, and everything ready for occupancy. Messrs. Longstaff & Hurd architects, Bridgeport, Conn.

Our engravings were made direct from photographs of the building, taken especially for the SCIENTIFIC AMERICAN.

### A DWELLING FOR \$1,900.

The engraving, page 36, illustrates a dwelling of low cost, erected for Mr. John W. Thompson, at Gardner, Maine.

Dimensions: Front, 27 ft. 6 in.; side, 58 ft. Height of ceilings: First story, 9 ft.; second, 8 ft. 6 in. The underpinning is built of brick, with a foundation of stone. The building is sheathed, clapboarded, and painted light olive green, with dark olive green trimmings. Blinds are painted similar. Roof shingled and painted red. There is a cellar under whole of house containing the necessary apartments. The interior throughout is trimmed with white pine. The trim in hall and parlor is finished natural. The hall contains an ornamental staircase, and it is lighted with windows glazed with cathedral glass. Parlor is provided with a neat wood mantel. Living and dining rooms are treated in colors respectively. The trim in

kitchen is finished natural. Kitchen is wainscoted and fitted up with sink, with closets under same, and a large pantry. The shed is not plastered. There are three bed rooms on third floor, besides store room. These apartments are painted in colors. Cost, \$1,900 complete. Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

### A COTTAGE AT ASBURY PARK, NEW JERSEY.

The illustration, page 37, presents a cottage erected for T. A. Roberts, Esq., at Asbury Park, New Jersey. The design is excellent, and it combines both a pleasing exterior with a well shaded piazza and a convenient interior arrangement. The underpinning is built of brick, while the building above is of wood, with the exterior covered with shingles and stained to give it a quaint effect. The trimmings are painted white. Roof shingled. Dimensions: Front 34 ft.; side 31 ft., exclusive of piazza. Height of ceilings: Cellar 7 ft.; first story 9 ft. 6 in.; second 9 ft.; third 8 ft. 6 in. Cemented cellar under whole of house, contains laundry, furnace, coal and vegetable cellars. The partition walls of these apartments are built of brick. First floor contains hall, parlor, dining room and kitchen. The interior throughout is trimmed with white pine. Hall contains an ornamental staircase, which is separated from hall proper by a spindle transom. This hall and staircase are lighted effectively by stained glass windows. A small den is fitted up beneath this staircase. Parlor is painted and finished in old ivory white; it is provided with a large open fireplace, furnished with tiles and mantel of colonial style. Dining room has a paneled wainscoting and it is painted a dull olive brown. The brick fireplace has a tiled hearth and a wood mantel. Kitchen and pantries are wainscoted and fitted up replete in every respect. Second floor contains four bed rooms and bath room, all treated in colors. Bath room is wainscoted. There are three bed rooms on third floor. Cost \$5,300 complete. Mr. J. William Roberts, of 222 Market Street, Newark, N. J., was the architect. Our engraving is made direct from a photograph of the building, taken especially for the SCIENTIFIC AMERICAN.

### A COLONIAL HOUSE AT PORTLAND, MAINE.

We present on page 40 a dwelling, colonial in treatment, erected for A. L. Bates, Esq., at Portland, Maine, and from plans prepared by John Calvin Stevens, architect, same place. Dimensions: Front, 35 ft. 6 in.; side, 55 ft. 6 in., exclusive of front porch. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 9 ft. 6 in.; second, 8 ft. 6 in.; third, 8 ft. The underpinning is built of local brick, while the superstructure above is built of wood, with the exterior framework sheathed, shingled and left to weather stain. Blinds painted bronze green. The design has the appearance of comfort and convenience, while the interior contains many large, well lighted rooms, that are varied in their treatment. Hall is trimmed with laurel. The broad, low staircase, with carved newels, the pleasant little den beneath this staircase and the arch supported on fluted pilasters with carved capitals, are the features of hall, while the old casement window, with seat, and the antique mantel in dining room, are in keeping with the several spindle transoms that carry out the colonial effect. The hall and staircase are lighted effectively with windows glazed with stained glass. Parlor is finished in a delicate manner with old ivory white, while the library is trimmed with cherry and dining room with mahogany, the latter having a paneled dado five feet high and a china closet with beaded glass doors. Fireplaces have tiled hearths and facings and mantels of colonial style that correspond respectively with the trim of each room. The floors are laid with brick in narrow widths and highly polished. Kitchen is trimmed and wainscoted with whitewood, finished natural, and it contains well fitted up pantries, sink, range and private stairs to third floor. There are four spacious bed rooms, large closets, dressing room and bath room on second floor, and two bed rooms on third floor, besides ample storage. These apartments are trimmed with whitewood finished natural. Bath room is wainscoted and it contains tub, bowl, closet and linen closet replete. Cemented cellar contains laundry, furnace and other apartments. Cost \$3,800 complete. Our engraving was made direct from a photograph of the building, taken specially for the SCIENTIFIC AMERICAN.

If any of our readers have made an invention for which they have thoughts of taking a patent, they are invited to communicate with Messrs. Munn & Co., the publishers of this paper, who for a period of forty-three years have conducted a most successful bureau in this line. A pamphlet of instructions will be sent free, containing full directions how to obtain a patent, costs, etc. In very many cases, owing to their long experience, they can tell at once whether a patent probably can be obtained; and advice of this kind they are always happy to furnish free of charge. Address Munn & Co., SCIENTIFIC AMERICAN office, New York.



## LAWN PLANTING: HOW TO DO IT AND WHAT TO AVOID.

After their houses are built, most owners begin to give practical consideration to their surroundings. Chief among these, as regards their appearance, is the planting of the ground, if there is to be any about the house. They are wise who do some of their planting before the house is built, if they have the opportunity, for although skill and care avail much, they cannot give the growth to trees that time alone produces, and if we can get one or more years' start of the builders, a great gain will be made in home feeling and attractiveness when the house comes to be occupied. The great impediment to the advance of landscape work about American homes is the ease with which most of our people accept bad work and are satisfied with bad results. They go to the nearest man who calls himself a gardener or florist, receive and pay for what he chooses to do for them without question or hesitation. However good these men may be as propagators or cultivators, there is not one among a thousand of them who has any idea of what constitutes a good design, or of the principles of landscape gardening, or good taste, even if they have been employed about such work for years. As well might we employ a blacksmith to plan stables because he makes good horseshoes. The advice of a man of experience and education in these things is always best, even if we cannot have him superintend the work. He will usually save us more by

cussion of the merits of different trees and shrubs would take a volume if justice was done them, and the lists so often given are good for a limited locality only; but a little practical observation of what does well in the neighborhood or similar localities will be of the greatest assistance. If, after a fair trial, we find a thing does not flourish, but presents a poor appearance, remove it and replace with something good. Our grounds will not have a wholesome, clean appearance without healthy vegetation. Some localities will allow a much larger and better selection of varieties than others, but the principle holds good wherever a house may be built.

In planting especially we must "think ahead," and arrange in our plan those trees that may eventually be expected to grow large and want much room, such as elms, oaks, maples, and tulip trees, so that they will not have to be sacrificed or crowded out of shape in after years just as they begin to develop their highest beauty. Often on small places the only available situation for large-growing trees is between the sidewalk and road, and here plenty of room between trees should be allowed. Forty feet is little enough between large-growing ones, but they may be planted twice as near if quicker shade is wanted, and alternate trees cut out as soon as they begin to crowd. It requires faith in trees and courage to thin them out, after a growth of some years, even if they were originally planted with the intention of doing so, for mistaken tree lovers are

arrange our trees and groups to keep it out of sight. If well done, their use will never be obtrusive. If we are fortunate enough to have no objections of this sort, we need only arrange so as to leave unobstructed the finest outlooks and practice our skill in developing the best foregrounds. If we wish seclusion from obtrusive neighbors or too inquisitive passers-by, we can well contrive a screen of trees and shrubs that will serve the purpose. It is often best to choose evergreens for this use, particularly in the Northern States. Shall we want protection from high winds? If so, we may want a wind break. Trees to the north of a house protect it from cold winds and do not keep off the sunshine. We want shade, but not so much directly about a house as to prevent the sunshine reaching it, and to stop the growth of grass. This must be thought about in arranging large-growing trees, and in no locality where the summer weather is hot must we obstruct the cooling breezes immediately about the house.

Unless we adopt an elaborate geometrical plan of laying out our grounds with hedges, clipped shrubs, and things in exact order (a system which certainly has attractions to recommend it, for certain situations, in spite of all the opposition and ridicule that has been directed against it), we should avoid anything like formality in our lawn planting.

Let us insure good open spaces of clear sward. The larger, the better will be the effect. Especially on



LAWN PLANTING.—FROM A PHOTOGRAPH TAKEN AT NEWPORT R. I.

avoiding mistakes that would otherwise be made than his assistance costs. Obviously the best time to escape mistakes and bad effects is when the work is being done. Have a well considered plan, whether the work to be done is great or small. A matter of such far-reaching importance should only be intrusted to competent hands. There is no better field for impostors, because results are often years in developing, giving them all the chance they want to escape the results of ignorance and incompetency to themselves.

There are no hard and fast rules about landscape planting, but there are some principles that should be regarded; for if neglected, we will never have the most satisfactory results. Keeping in mind the general broad effects we wish to produce, we should direct our efforts to perfecting them; details will easily arrange afterward, but mistakes in design and placing of trees are fatal to best results. With perhaps the exception of two places on a dead level with similar buildings, every place requires separate study as to a plan of operations best fitted to bring out its advantages, and to the skill with which this is done is mainly due the ultimate success. If we are at work on a large country place, there is more scope for our abilities; but on small areas we should avoid the common error of attempting too much. If we hope to accomplish "much in little," we must use our brains the more. We must consider the wants and capabilities of the situation, the needs and tastes of the coming occupants, avoid curiosities and untried novelties, that are well enough for botanists and experimenters but only a discouragement on the generality of grounds. Most people want freshness and growth, and care little for ugly rarities. A dis-

almost sure to protest. It is better to have them twice too near and then thin out than to compromise in planting on twenty-five or thirty feet and then have them crowd or leave great gaps where removed, that the living generation will not see grow together. Sometimes short-lived, quick-growing trees, like willows or poplars, are used alternately with the more permanent kinds. This is advisable in some situations, but an avenue or country road never presents so fine an appearance as when the bordering trees are all of the same variety and characteristics regarding shape and size.

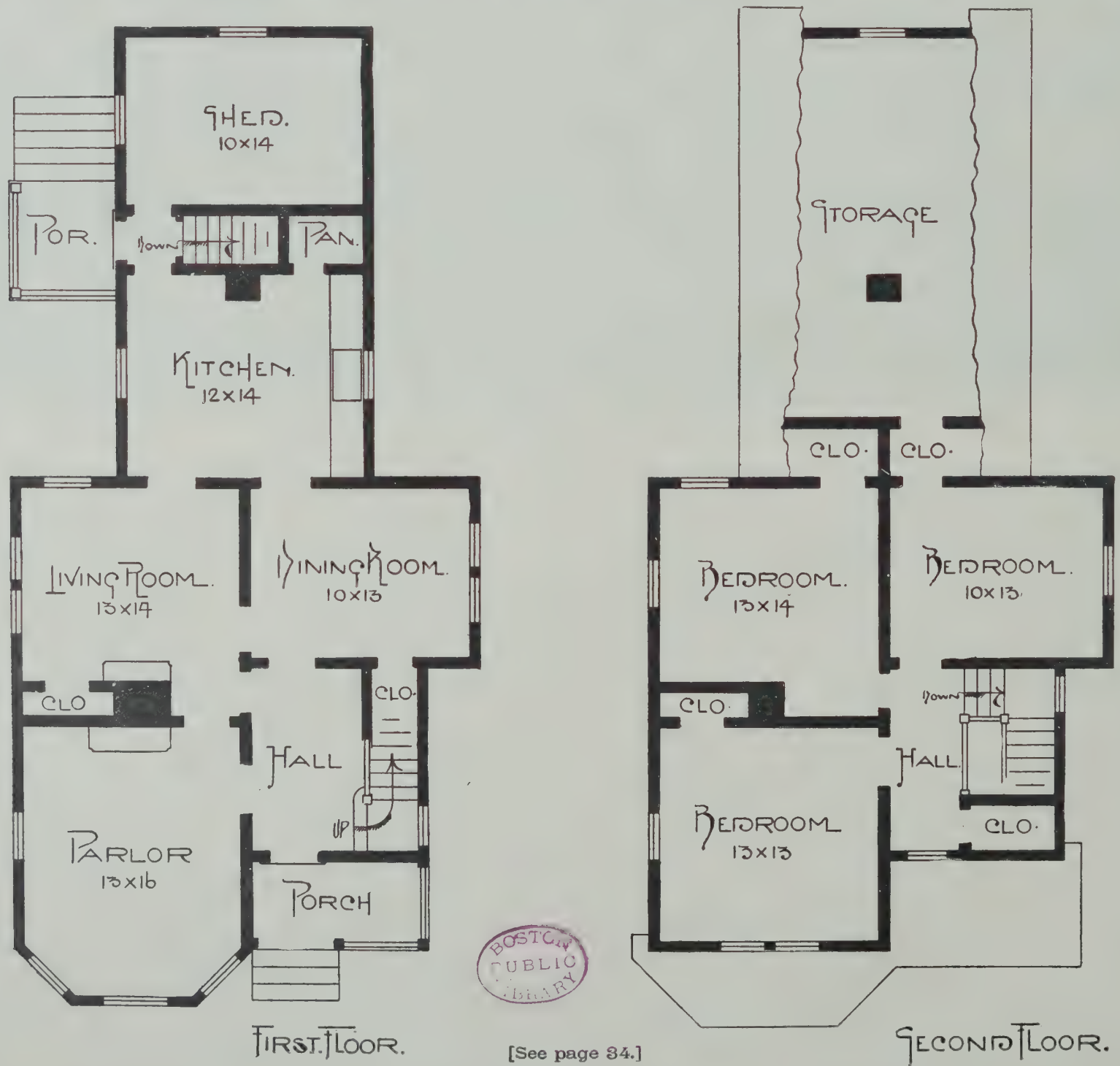
Trees and grass are our main dependence in giving finish and elegance to our home surroundings. With them alone beautiful effects are produced. The art of placing them so they not only display their individual beauties, but harmonize and emphasize the best points of the whole plan, is the best work of the true landscape artist. Shrubs and vines come next in usefulness, attractiveness and permanence, but a good lawn partly overhung with fine shade trees is the main consideration. These take time and labor to attain, but are more lasting in their beauty than other things, suffer less from temporary neglect, endure drought and floods better, and remain with us during a lifetime. In making new places there is often a mistaken delay in waiting until the house is built before asking advice of a landscape gardener. His suggestions in regard to the position of the buildings often add greatly to the convenience and appearance of the place. When the house is built, however, we must make the best of it. In making plans for planting let us first consider what there is disagreeable in view from the place, and

small places should we allow unobstructed views across the whole extent, with the boundaries carefully planted about with an irregular belt of trees and shrubbery in such a way as to conceal them, unless they run into adjoining grounds or roadsides of the same character, where no visible division line is the best one we can have. Their actual extent to the sight should appear undetermined. It is astonishing what an apparent extent can be given to small places by skillful planting. If there are no buildings or other high objects in close proximity, it can often be made a perfect success, and a feeling of space given that is delightful. Trees on adjacent places and grounds of suitable character can often be made to contribute to the effect in a happy manner. If we must have fences, let them be as unobtrusive as possible and of a dark, inconspicuous color.

In grading the great thing is to do as little as possible. No operations in landscape gardening are so expensive and usually unsatisfactory as moving large quantities of earth. An artistic conception of the best effect that can be produced under given conditions is most valuable. The good effects of the planting can often be greatly heightened by having the lawn rise somewhat as it approaches the bordering of shrubs, which, when they crown a rising slope, can be given most beautiful outlines against the sky. Long, easy lines of grade are most admired, whether we look up or down upon them. A dead level is not good, but the appearance of a near approach to one in the open center is much to be desired. The necessary digging for building operations and road making renders more or less grading inevitable, and by a carefully considered plan the earth can

(Continued on page 38.)





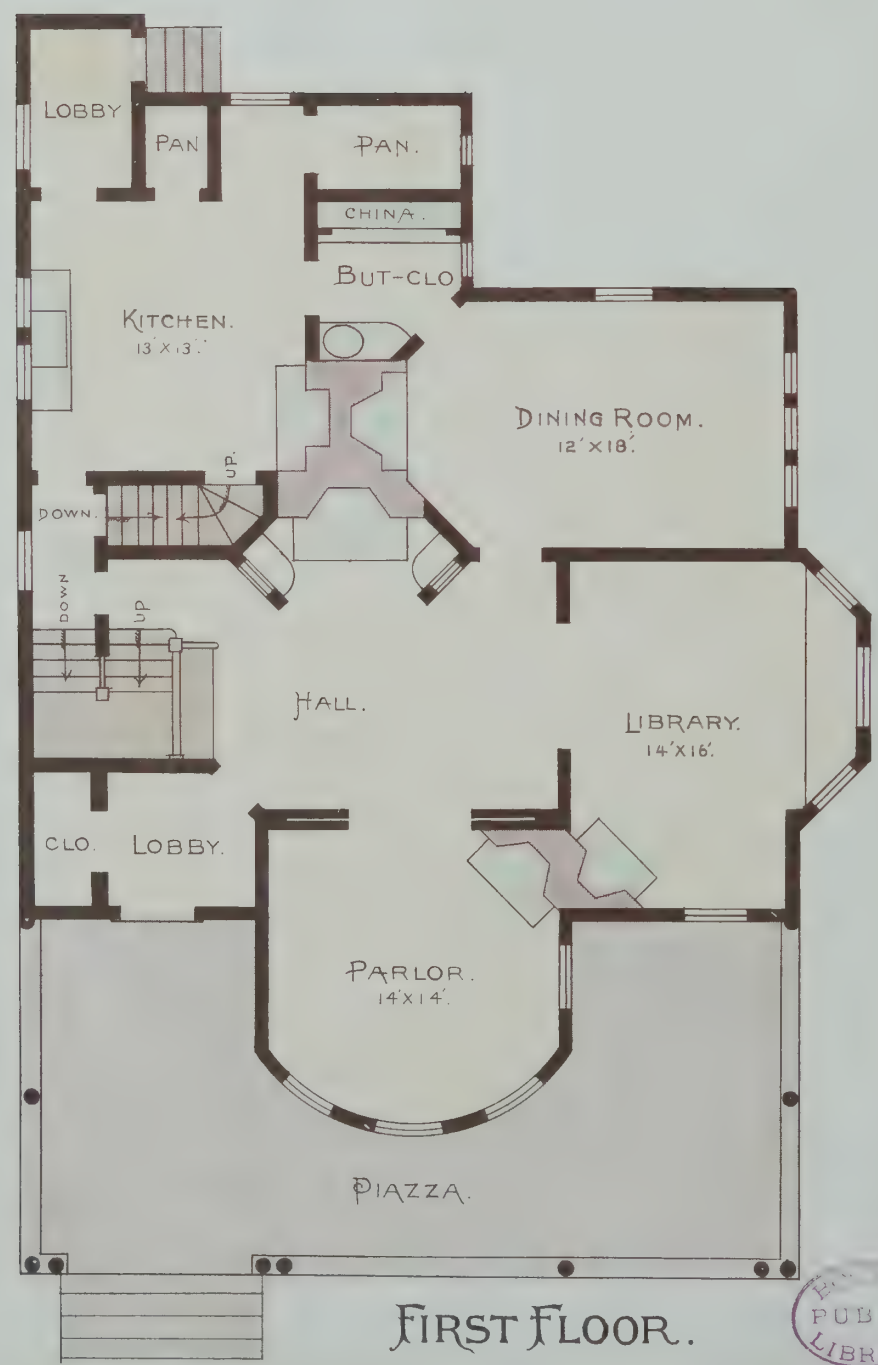








A COTTAGE AT SEA-SIDE PARK.







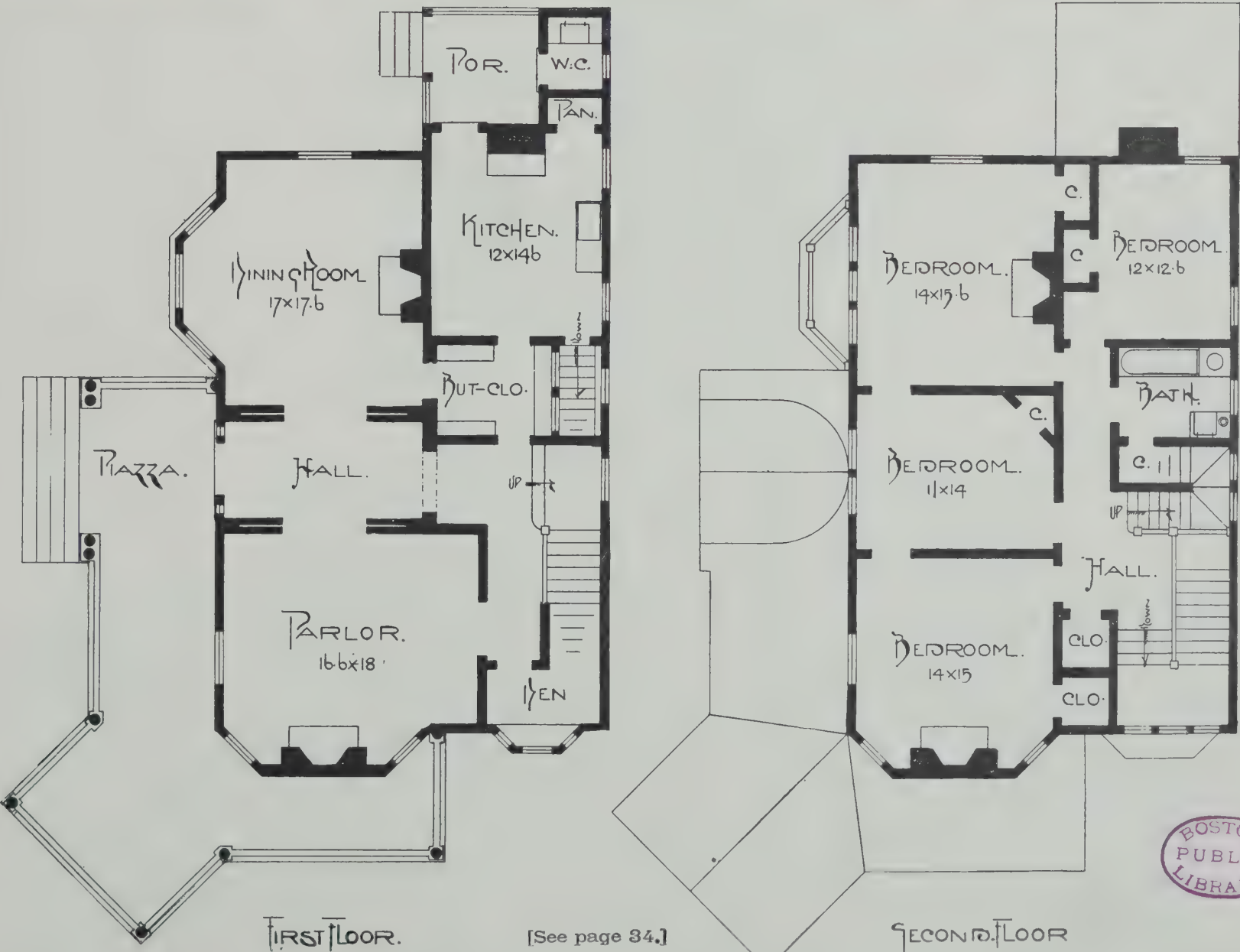
A COTTAGE FOR FIFTEEN HUNDRED DOLLARS.











A COTTAGE AT ASBURY PARK.





## LAWN PLANTING.

(Continued from page 35.)

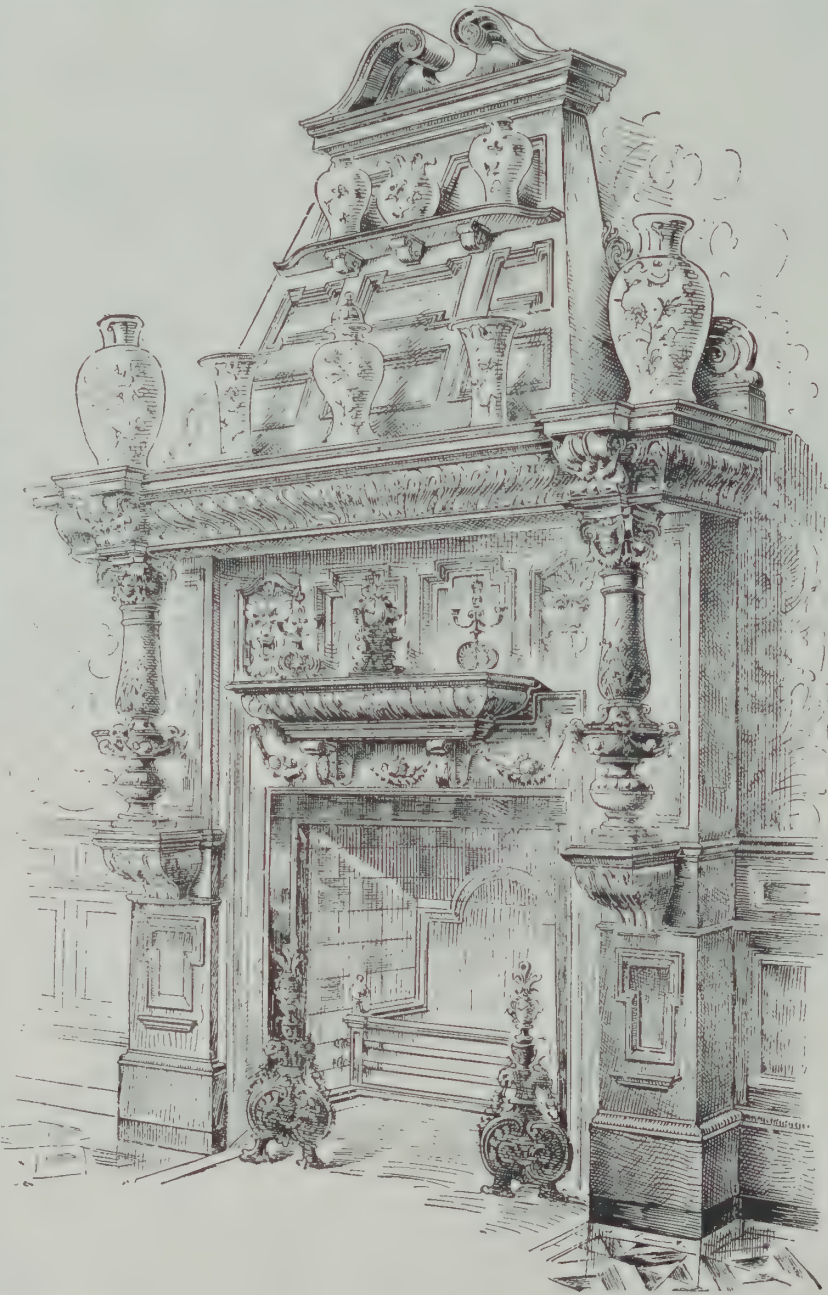
be roughly put in position when it is first moved and much future labor saved. The reciprocal effects of the smooth, gently sloping surface of a good lawn and the encompassing masses of irregular foliage and shadow are something nearly every one feels, but we do not all pause to analyze them. Large weather-worn and lichen-covered rocks, or ledges of them, the rugged trunks of old trees, like the live oak, apple, locust and cherry, are all valuable used in this contrasting way, and it is fortunate to have them. Rocks broken or freshly dug from the earth are hopeless and of no use in an artistic sense. If we cannot get rid of them, they may be hidden by clinging vines. Whatever else we do, we should preserve a broad, clear, unfilled space in the middle of our lawns, the larger the better. This is a principle more often violated than any other, and is the cause of the crowded, confined appearance of so many places we see, large and small. There is always a temptation to place a beautiful object, sure to be admired for itself, on an inviting open space; but it should be resisted as the spirit of bad taste striving to destroy the simplicity and elegance of our grounds considered as a whole. Better places can be found for rock work, shrubs, flower beds, fountains, statues, rustic work or any permanent object intended for use or decoration. For the generality of lawns no better system of planting has been discovered than that of a broad, open center, with an irregular bordering of trees and shrubs. On places of considerable size several lawns can be made with different effects in their surroundings, and delightful vistas between the growth, but unless there is ample room the result will be poor. Better one good one than many that are bad.

Let us first place on our plan the trees that will eventually want plenty of room—oaks, elms, chestnuts, or the great Southern magnolia—so that they will have a chance to develop, and then form groups and masses with other things about the sides of our grounds. This work gives a great opportunity for the display of artistic skill in arrangement and combination of differing tints in foliage and flowers, with knowledge of our materials; but we will not go far wrong if we plant the tallest-growing kind to the back or in the center of our groups, and arrange the others irregularly in front, according to size and habits of growth. Allow for development, but do not scatter so as to destroy the mass effect. Thin and weak-growing things often do best when they are clumped together; others, with good forms and thick growth of foliage, appear best almost isolated. We must have a care not to crowd and destroy the lower branches of such things as hemlocks, spruces, and firs, that should always retain their lower branches to look well. Near the inner edges of our low shrubbery some tall, graceful trees, like the thread-branched Japanese retinospora, cut-leaved weeping birch, or those of striking forms, palmettoes and other palms, where they will grow, the ginkgo, or the Camperdown elm, appear to advantage. Most deciduous trees grow all the better with shrubbery about them to retain moisture and shade the ground. In exposed localities tough, quick-growing trees, like the larches, are planted to afford protection to tender young trees, and taken out when the others become established. Plant those things you like, provided they will thrive under the conditions, avoid dotting them about, and never plant in straight lines for a border. Have curving edges so shaped as not to make it too difficult to mow about them. Arrange so as to have a picturesque outline against the sky, and put enough of a kind together to make a show, three or four on small places and ten times as many on large ones.

A few shrubs with brilliantly colored and variegated foliage are desirable for contrast and color effects, but, if overdone, they give a place a blighted, sickly look. Let most of our foliage be that which is a clear, constant green until autumn. All tones of green in foliage harmonize. Careful arrangement adds much to color effects, but if we depend upon greens, we will not go wrong. It is generally well to have some low shrubs immediately about the house, for it unites the building with the ground in the best manner, and adds cheerfulness and beauty. In making our selection for this purpose, it is well to choose things that are neat and trim in their growth, and with good foliage, rather than for their flowers. For this reason the dwarf evergreens, privets and rhododendrons are well adapted to use.

Some things, like the lilacs, are of the greatest beauty when in their short period of bloom, but afterward look sorry enough, afflicted with rust or mildew. They are useful in the borders or centers of groups, where their beauty is sure to attract admiration when in flower, and they are not obtrusive at other times. Shrubs with powerful odors, like some of the Southern magnolias, stephanotis, syringas, and some others, are best planted where people living in the house will not be obliged at all times to inhale their odor.

If the ground we are to plant is about a home occupied throughout the year, we should have in our selections an abundance of early flowering things, for their beauty and bloom are most refreshing after the poverty and cold of winter; but, if only occupied during the heat of summer and early fall, we should select accordingly, omitting those things which, although beautiful in early spring, make a poor show at other times when they would be seen. This selecting for different seasons is a most interesting study, and, of course, should vary to suit the climates of the different States of our Union; but even in the latitude of New York a varying scheme can be arranged for every month of the year, for some of the evergreens and the



DESIGN FOR A WOODEN CHIMNEY PIECE.

brilliant twigs and bark of many shrubs give color and freshness even in the depths of winter.

Experience has proved that well grown nursery stock is by far the best for general planting. The special cultivation and root pruning it is usually subjected to, fit it for removal. Trees from the fields and woods, although sometimes without objections, do not readily adapt themselves to changed conditions, and if the labor of collecting and transplanting has to be paid for, they often cost more than to buy the best. Wherever they come from, the roots should never be allowed to dry. More things are probably lost from allowing this to happen than from all other causes combined. The first start in growth is made from the fine rootlets, and if these are destroyed, so much energy and vitality of the plant goes to restore them that it does not always recover.

The soil we must use is that upon the place; we can modify it, but not change it. It will almost always want enriching. Plenty of good stable manure and wood ashes will make woody growth succeed upon any soil not absolutely dry some part of the year. Hardly any kind of fertilizer will go amiss, however, and the best is usually what is convenient. In regard to pruning, most people want restraining when they start in. Thin out dead wood and weak growth, and cut back if necessary those things that flower on new growth,

some time during the late winter or early spring. After the early bloom is over, about the last of June, they should be worked over again and shaped for the season. Cut back straggling growths, and prevent the interiors from becoming clogged. Let each variety develop its special peculiarities and individual charm. Take care and do not cut them into the semi-artificial monotonous shapes so many gardeners are prone to do. A person fond of shrubs will watch them growing, and by little trimming and clearing just when it is wanted, keep them in order at all seasons and do without any pruning time. JOHN DE WOLF, *Landscape Architect*.

## AN ORNAMENTAL CHIMNEY PIECE.

We give from the *Building News* a design for a wooden chimney piece which is considered to be rather artistic. It contains several suggestive features. The dimensions are 8 ft. 3 in. by 11 ft. high.

## A COTTAGE OF MODERATE COST.

We present on page 41 a cottage of low cost, erected for Mr. M. S. Gibson, at Portland, Me. Size of structure, 30 x 48 ft. 6 in., exclusive of piazza, porch, and bay windows. Height of ceilings: Cellar 7 ft., first story 9 ft., second 8 ft. 6 in., third 8 ft. The design is quaint and picturesque, and it presents a pleasing bit of suburban architecture. It has a pleasant piazza, a tower and a triangle bay window extending up two stories. Underpinning brick. First story clapboarded and painted pearl gray. Second story, gables, and roof are shingled and stained sienna. The interior is quite roomy and comfortable. Hall, spacious, is trimmed with oak and is entered through a vestibule. This hall contains a staircase of unique design, which is lighted by stained glass windows, and a nook with seat and fireplace, built of brick, with hearth laid with same. Parlor is trimmed with clear white pine and is treated with old ivory white in a delicate mantel. The fireplace has a tiled hearth and facings and a mantel of exquisite design. Dining room is trimmed and wainscoted with antique oak, and is fitted up with nook and fireplace. Kitchen and pantries are wainscoted and trimmed with whitewood, finished natural, and are fitted up replete in every respect. There are four bed rooms, with large closets and bath room, on second floor. These apartments are trimmed with whitewood finished natural. Bath room is wainscoted. Three bed rooms and storage on third floor. Cemented cellar contains furnace and other apartments. Cost \$3,500 complete. Mr. John Calvin Stevens, architect, same place. Our engraving is made direct from a photograph of the building, taken especially for the SCIENTIFIC AMERICAN.

## A QUEEN ANNE COTTAGE.

We publish herewith on page 44 an attractive cottage, Queen Anne in treatment, erected for the Argyle Improvement Co., at Babylon, L. I. A very artistic exterior. Large porch across the front. It contains ten large rooms, well lighted and arranged for convenience. Foundation, brick piers, built upon good footings of stone. First story clapboarded, second story and gables shingled, painted chrome yellow, with ivory white trimmings. Blinds painted bottle green. Roof shingled and painted red. Dimensions: Front 50 ft.; side, 34 ft., not including front piazza. Height of ceilings: First story, 10 ft.; second, 9 ft. The interior throughout is trimmed with white pine, painted in delicate colors. Hall contains an ornamental staircase turned out of ash. All the apartments on first floor have open fireplaces, built of brick, with hearth laid of same and slate mantels. The floors throughout are of hard wood (yellow pine), laid in narrow widths and oiled. The windows throughout have transoms glazed with stained glass, shedding a pleasant light over all apartments. Kitchen and pantries are fitted up in the best possible manner. Second floor contains four chambers, two of them across the front *en suite*. Bath room and five large closets. Bath room is wainscoted with black walnut and fitted up in the usual way. There is one servants' room in attic, besides ample storage room. Cost \$2,800 complete. Mr. R. B. Eastman, architect, Brooklyn, New York. Our engravings were made direct from photographs of the building taken especially for the SCIENTIFIC AMERICAN.

FORESTS occupy 39 per cent of the total area of Sweden, 36 per cent of Russia, 32 of Austria, 28 of Hungary, 25 of Germany, 24 of Norway, 19 of Belgium, 17 of France, 18 of Switzerland, 17 of Spain, 12 of Italy, 4 of Great Britain and Ireland, and 19 of the United States.



THE ODD FELLOWS' TEMPLE, CHICAGO.

The new temple soon to be built in Chicago by the Odd Fellows of the State of Illinois is to be one of the most imposing structures of its kind in the United States, and the tallest building in the world. Rising to a height of 556 feet, the tower will be visible at a distance of sixty miles, and every available foot of space will be utilized. Upon the ground floor the area covered will be 43,000 square feet, and the total area inclosed by the various floors, exclusive of walls, partitions, corridors, etc., will be something over 350,000 square feet.

Twenty stories of the building will be included in the main structure, while the tower is to be fourteen

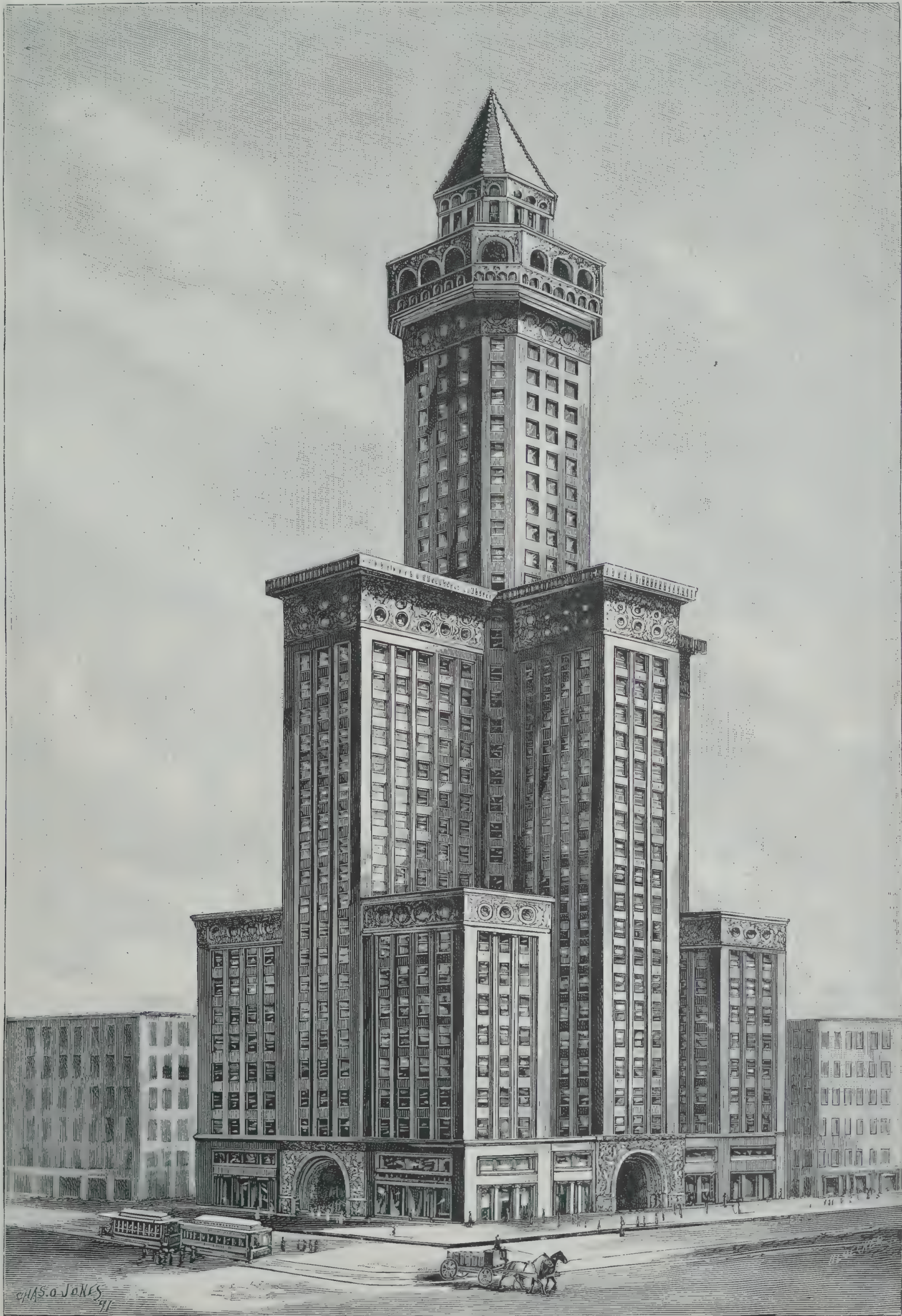
stories high, and, like most of the rest of the building, will be devoted to offices, eighteen elevators and four stairways giving access to the topmost floor. Five floors of the building are to be devoted to lodge rooms and public halls, among the latter being a drill hall, with an area of 8,000 square feet.—*The Graphic*.

A Suggestion for Inventors.

A correspondent, who lives in the distant colony of Tasmania, Australia, indicates his troubles in land clearing, and calls for inventions as follows :

Could you publish in your SCIENTIFIC AMERICAN the best devices for felling trees and cutting them up when down, say from two to four feet in diameter ?

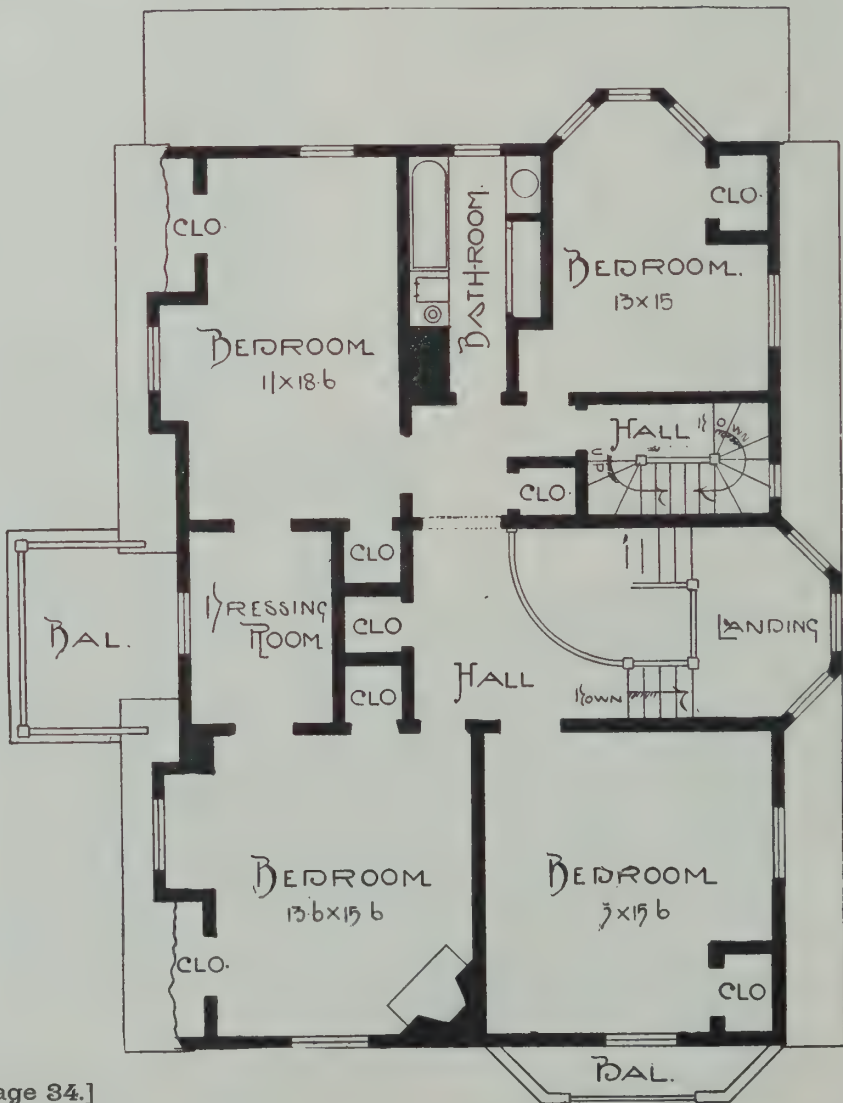
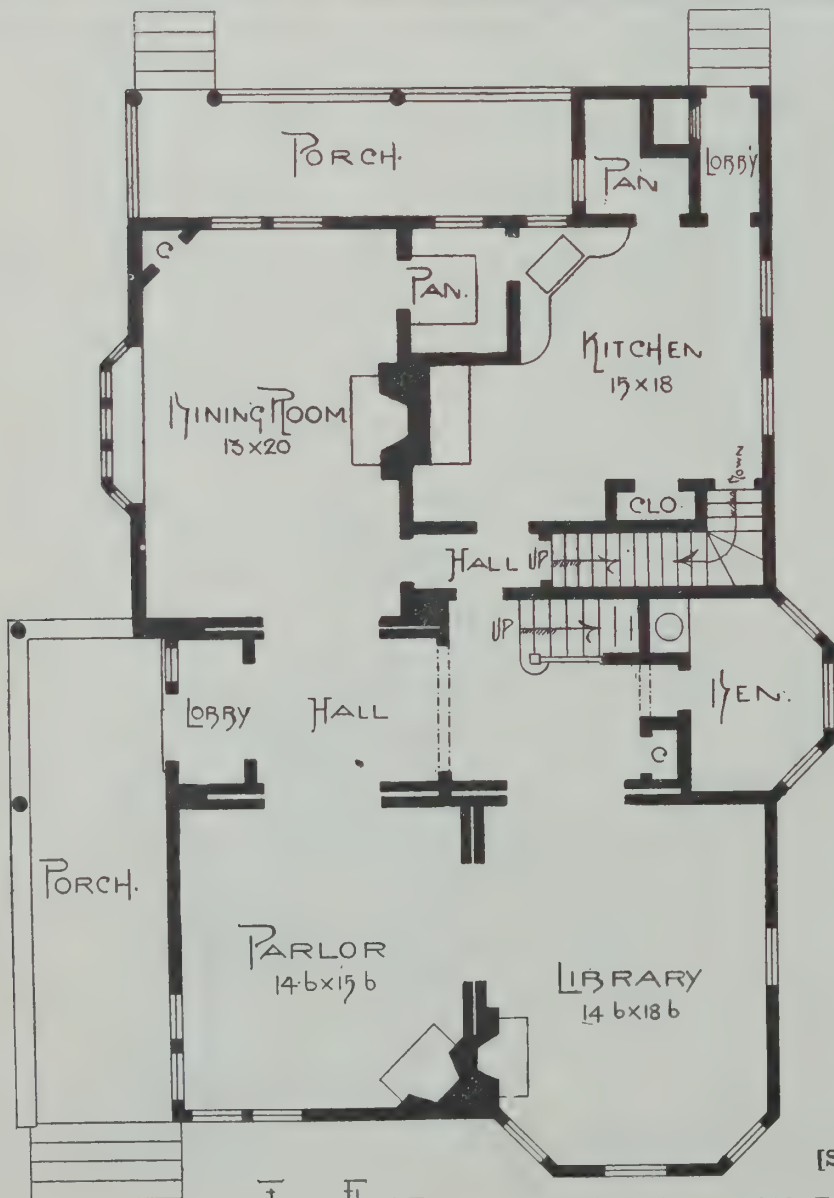
We have an immense lot of timber on the land in Tasmania. When a selector takes up a block of land, the device we have is to fell the trees with an ax, and, when down, two men cut them up into say 15 ft. lengths with a cross-cut saw, roll them together in heaps and burn them. The timber is of no value, there is so much of it. There are as many as 400 and 500 trees per acre, averaging about 3 ft. in diameter and about 200 ft. in height. They cost the selector about five dollars per tree to get rid of them ; so you will see that it is not all sunshine with the selector in Tasmania. What we want is something to reduce the cost per tree ; or, in other words, some device other than felling them with the ax, as it is so laborious.



THE PROPOSED ODD FELLOWS' TEMPLE AT CHICAGO.







[See page 34.]

FIRST FLOOR. A COLONIAL HOUSE AT PORTLAND, ME. SECOND FLOOR.







[See page 38.]

A COTTAGE OF MODERATE COST.





AN ENGLISH COTTAGE.

We are indebted to the *Building News*, of London, for the sketches herewith given of a cottage at Ralston, Bromley, Kent, Evelyn Hellicar architect. The design presents a number of noticeable features and suggestions. The hall and stairway thereof are quite attractive. If built of brick, in a solid, substantial way, such a house would cost here about \$8,000; but if constructed in wood, a less sum. As here shown, the walls, to about the height of the first floor, are faced with red bricks; above, the walls are hung with weather tiles of a good red color, the same being used to cover the roof. The ground floor accommodation will be seen by the plan. The first floor contains five bed rooms, dining room, ball room, etc. The illustration is from a drawing shown in last year's Royal Academy.

Acoustics.\*

The theory of sound has been pretty well worked out; but the difficulty lies in applying it to the endlessly varying sizes, shapes, materials, and details of different buildings. It is not so much that the principles of acoustics are unknown as that the working out of their results, in any but the very simplest cases, forms too complicated a problem for practical solution. Some writers on the subject, though not usually the scientific ones, profess great faith in strict numerical relations between the length, width and height of an interior. They would have us believe, for instance, that if a building is 80 ft. long, 60 ft. wide, and 40 ft. high (or if its length, width and height are other multiples of 4, 3 and 2), it is sure to be successful for speaking in. Practice, as might be foreseen, does not support this fancy, and in the case supposed everything would really depend on the materials, and on the treatment of the internal surfaces. Moreover, the taking away of 2 ft. or 3 ft. either from length or width of such a building, which on this supposition ought to destroy its acoustic merits altogether, is, in fact, more likely to improve them. And, again, the principle, such as it is, becomes unworkable when one has to apply it to any but a plain, oblong room, with a flat ceiling, a room which, of all places, is apt to be the worst for speaking in. What, for instance, are we to consider the length, and what the width, of such a plan as A or K or L, and at what points must they be measured? Yet such plans as these are incomparably better, as regards acoustics, than the plain oblong which the hypothesis presupposes.

But, on the other hand, a building which is to be successful for speaking in must have all its dimensions within certain *general* limits, regulated by the distance to which an average voice can be distinctly heard. Sir Christopher Wren considered this distance to be at least 50 ft. in front of the speaker, 20 ft. behind him, and 30 ft. on each side. This is doubtless, as regards the length, a very moderate estimate, and might fairly

be increased by 20 ft. or more. At the Metropolitan Tabernacle, Newington, which is 80 ft. wide from wall to wall, and 150 ft. in extreme length, internally, an exceptionally good voice is audible throughout. In this case there is, in the upper part of the building, a length of nearly 120 ft. in front of the speaker. On the ground floor and lower gallery, however, the extreme distance from him is only about 100 ft.

In buildings of a length like this, the chief difficulty is to conduct the sound to the farther end, and by all practicable means to prevent its being lost and deadened. For this purpose, wooden linings to the walls have been employed, and a ceiling semicircular in section. Echoes have also to be carefully guarded against,

common, are much lessened by chairs or pews, and destroyed by the presence of a full congregation, and by the use of carpets, cushions, etc. These, therefore, are comparatively harmless. The troublesome echoes are those from walls, and roofs or ceilings.

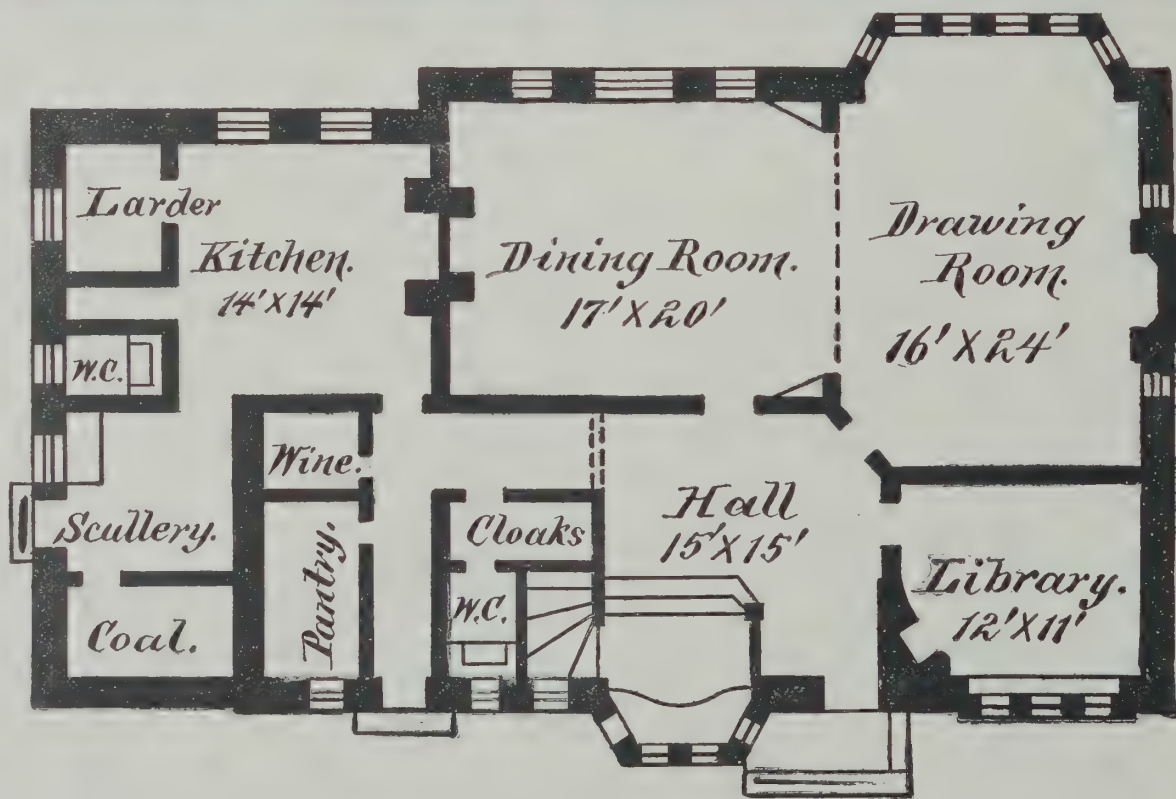
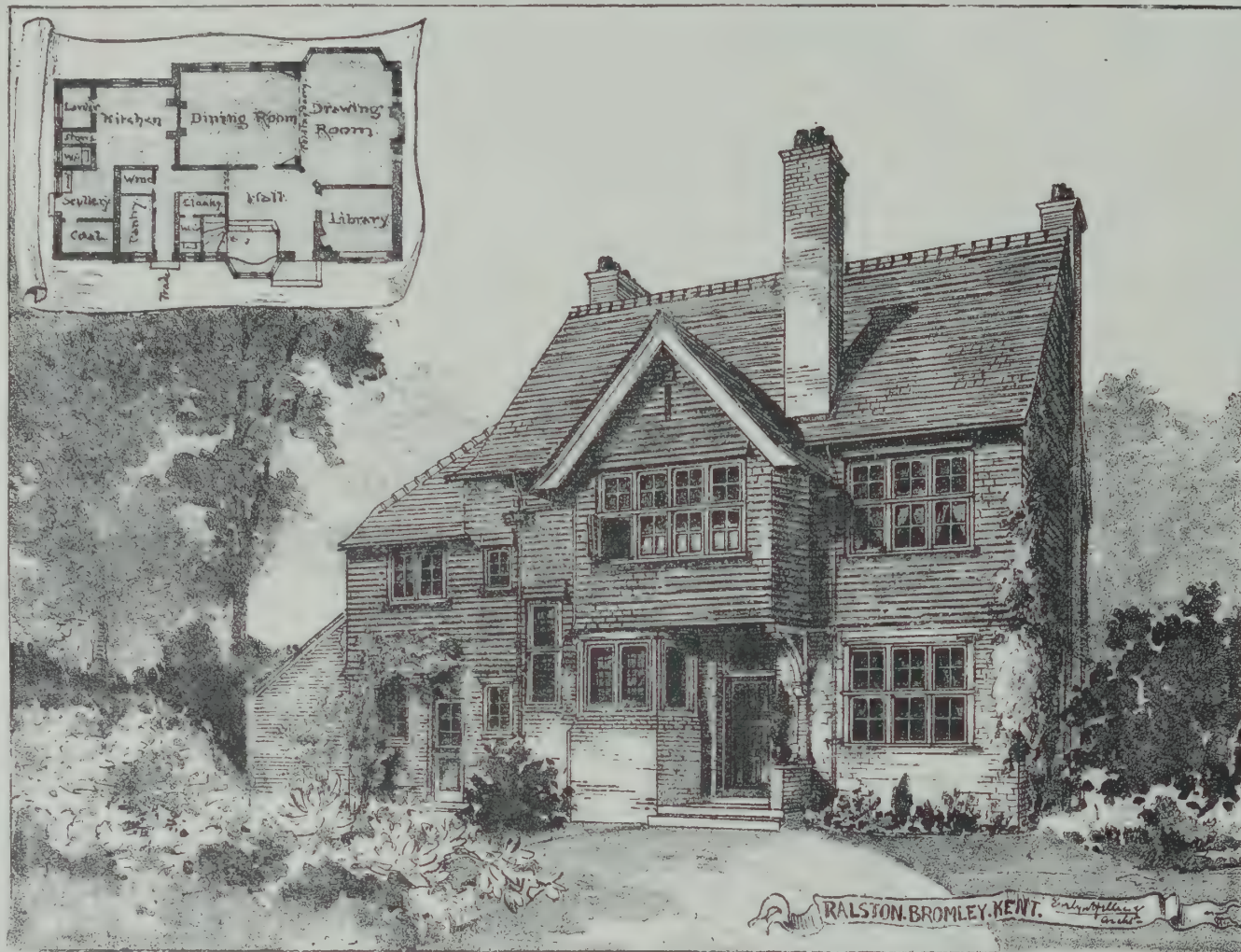
A flat, unbroken end wall, facing the pulpit, is pretty sure to reflect sound unpleasantly. This fact is so well known that an end gallery is often put in, less for its utility than with a view of preventing this evil. Any scheme, however, which will break the wall surface up into projections and recesses will answer the same purpose, and perhaps in a more architectural way. The corners of an oblong building, too, are great lurking places for echoes, particularly if the

building is destitute of columns. For this reason, corners of this sort are sometimes cut off obliquely, and at other times are broken up with projecting piers, which will have the same effect in a different way. The sides of deep transepts, again, facing the speaker, are likely to act as a flat end wall does if proper precautions are not taken. And if, as occasionally happens, the building narrows, even a very little, from one end to the other, or, in other words, is slightly wedge-shaped, there will be much danger of reverberation from the side walls, if the pulpit is put at the wider end. With a pulpit at the narrower end, wedge-shaped buildings have the reputation of being acoustically good.

A curved wall facing the speaker is commonly as bad as, or worse than, a flat one, provided, of course, that it is not effectually broken up by projections or recesses; and the same thing may be said of a polygonal one. It has been assumed, so far, that the building is without columns. For though columns when ill placed cause much obstruction to sight, they do make considerable atonement for this fault by breaking up and doing away with echoes. Moreover, it is quite possible to get the good from them without the evil, although, on the other hand, with unskillful treatment, it may happen that the evil remains without the good. The same principles that apply to walls apply to roofs and ceilings. All planes that face the speaker should be thoroughly broken up, and no flat or concave surfaces should be allowed in this position.

The right angle between a wall and a flat ceiling is usually as bad for sound as the right angle between the two walls, and should be got rid of in an analogous way. An angle at the ridge of a roof also leads to confused echoes, unless the pitch of the roof or ceiling be extremely low. Very obtuse angles are not objectionable. Anything like a large internal dome should be greatly broken up by ribs, coffers, or similar features. And internal roofs or ceilings should not be too high. A lofty space behind the pulpit is particularly bad, unless it has an open or closed screen across it, or is occupied by an organ.

To keep out rats and mice put in the lower part of the partitions a filling one foot high of mineral wool.



AN ENGLISH COTTAGE, RALSTON, BROMLEY, KENT.

especially from the end facing the speaker. But, in places of a smaller size, and of moderate height, means for conducting sound are not required, and echo and reverberation are the real dangers to be feared. In an interior where the farthest seat is not more than 60 ft. or 70 ft. from the minister, everybody may be considered within direct range of his voice. Wooden wall linings would do more harm than good, but careful study is needed to prevent the voice from being reflected back.

Echo and reverberation, which is only an echo or series of echoes, within too small a compass to be clearly heard as such, come mainly from even and unbroken surfaces. The surfaces may belong to either walls, roofs, or floors. Echoes from a floor, which are very

\* Abstract from a paper in *Building News* by James Cubitt.



## A RESIDENCE NEAR NEW YORK.

On page 45 will be found illustrations of a residence recently erected for W. E. Carhart, Esq., at Belle Haven Park, Greenwich, Conn.

Dimensions: Front, 50 ft. 6 in.; side, 46 ft. 6 in., exclusive of piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The design is an admirable one for a country house, and it is provided with a spacious piazza, porte-cochere, and porch at second story. Underpinning built of blue-stone. Exterior throughout is clapboarded and painted colonial yellow, with ivory white trimmings. Piazza posts are turned out of yellow pine and are finished natural with hard oil. Blinds painted bronze green. Roof shingled and painted red. The interior contains many large rooms. The first floor is handsomely finished in antique oak, the ceiling of reception hall being laid in panels. The broad, low staircase, antique mantel, and paneled divan are the features of hall, while the circular bay window, with seats, in drawing room, is in keeping with the several spindled transoms and beaded windows. Staircase is lighted with three stained glass windows. Library is provided with bookcases, built in on either side of fireplace. Dining room, good sized and well lighted, contains a nook for buffet. Fireplaces, where shown, are furnished with tiled hearths and colonial mantels. Butler's pantry is 11 ft. by 12 ft., and is properly fitted up with cupboards, drawers, and butler's bowl complete. Kitchen is wainscoted, and it contains sink, range, two large pantries, and lobby large enough to admit ice box. Back stairs to second story start from kitchen, and beneath these the stairs to cellar descend. There are five bed rooms, dressing room, and bath room on second floor, and four bed rooms on third floor. These apartments are trimmed with white wood finished natural. The floors are of hard wood. Cemented cellar contains furnace, laundry, store room, servants' bath room, and other apartments. Cost, \$11,000 complete. Messrs. Boring, Tilton & Mellen, architects, New York.

Our engraving was made direct from a photograph of the building, taken especially for the SCIENTIFIC AMERICAN.

## Timber in Damp Places.

The surface of all timber exposed to alternations of wetness and dryness gradually wastes away, becoming dark colored or black. This is really a slow combustion, but is commonly called wet rot, or simply rot. Other conditions being the same, the most dense and resinous woods longest resist decomposition. Hence the superior durability of the heart wood—in which the pores have been partly filled with lignine—over the open sap wood, and of dense oak and lignum vitæ over light poplar and willow. Hence, too, the longer preservation of the pitch pine and resinous "jarrah" of the East as compared with non-resinous beech and ash. Density and resinousness exclude water, therefore preservatives should increase those qualities in the timber. Fixed oils fill up the pores and increase the density. Staves from oil barrels and timber from whaling ships are very durable. The essential oils resinify and furnish an impermeable coating. But pitch or dead oil possesses advantages over all known substances for the protection of wood against changes of humidity. According to Prof. Letheby, dead oil, first, coagulates albuminous substances; second, absorbs and appropriates the oxygen in the pores, and so protects from eremacausis; third, resinifies in the pores of the wood, and thus shuts out both air and moisture; and, fourth, acts as a poison to lower forms of animal and vegetable life, and so protects the wood from all parasites. All these properties specially fit it for impregnating timber

exposed to alternations of wet and dry states—as, indeed, some of them do—for situations damp and situations constantly wet.

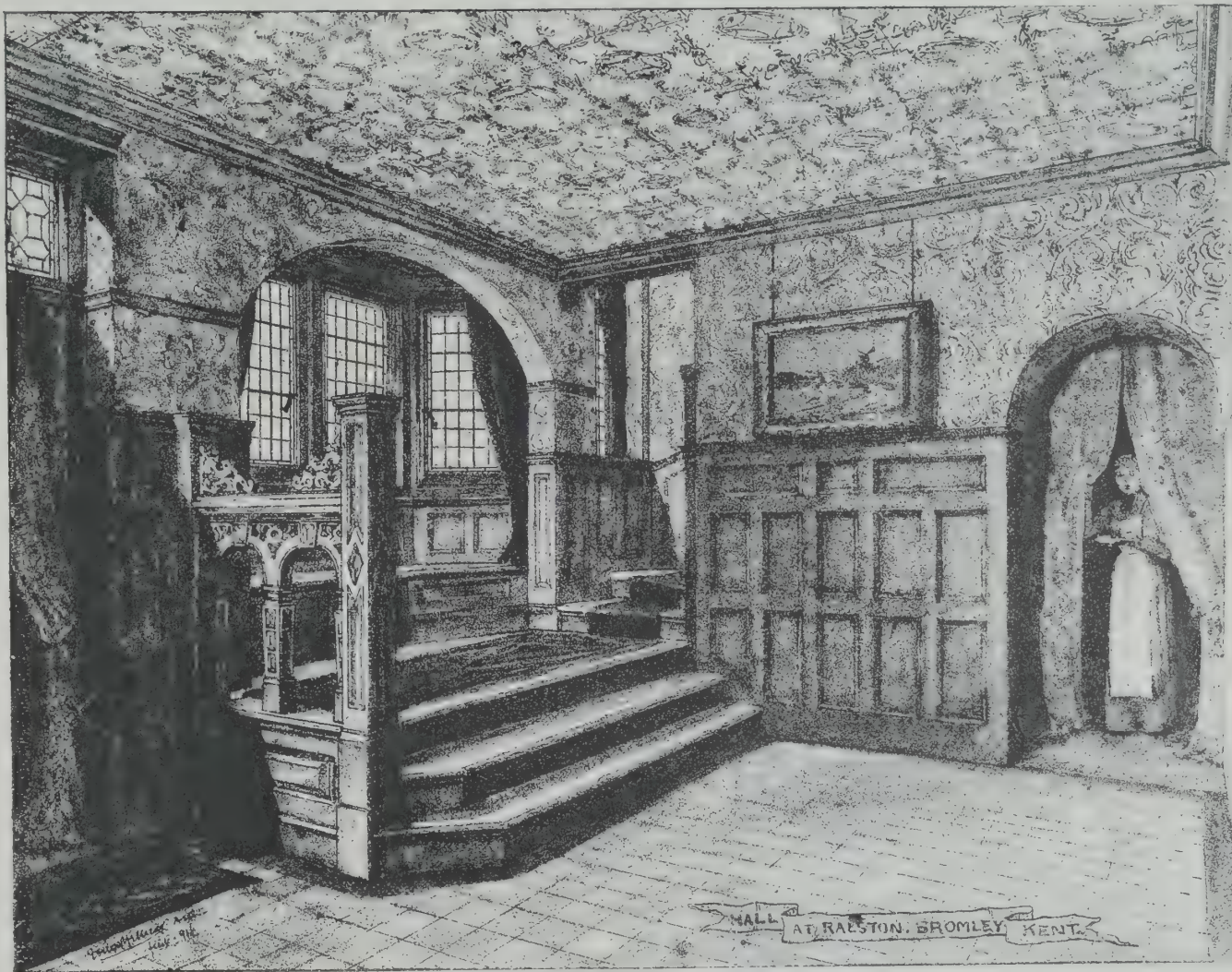
Dead oil is distilled from coal tar, of which it constitutes about 0.30, and boils between 390° and 470° Fahr. Its antiseptic quality resides in the creosote it contains. One of the components of the latter, carbolic acid (phenic acid, phenol)  $C^{12}H^6O^2$ , the most powerful antiseptic known, is able at once to arrest the decay of every kind of organic matter. Prof. Letheby estimates this acid at  $\frac{1}{2}$  to 6 per cent. of the oil. Chrysilic acid  $C^{14}H^8O^2$ , the homologue of carbolic acid and the other component of creosote, is not known to possess preservative properties. While an external application of coal tar promotes the preservation of dry timber, nothing can more rapidly hasten decay than such a coating upon the surface of green wood. But this mistake is often made, and dry rot, instead of wet rot, does the work of destruction. Carbonizing the surface also increases the durability of dry, but promotes the decay of wet, timber. Farmers very often resort to one of the latter methods for the preservation of their fence posts. Unless they discriminate between green and seasoned timber, these operations will prove injurious.

## They Bought Burning Houses.

One of the strangest businesses in ancient Rome is

in volume of the gases, as otherwise cold air from the top would descend to fill the vacancy left by the contraction of the gases, and the draught would be checked. Reasonable as this theory seemed, practice has shown that cylindrical boiler or furnace flues are at least as good as the tapered ones, and within a few years practical engineers and architects of experience in such matters have inclined to make them slightly larger at the top than at the bottom, the increase in diameter being, perhaps, half an inch to ten or twelve feet. Recently, a Swiss engineer has made experiments to see whether the facts bear out the old rule or support the more modern practice. To make the test, he built a chimney over a furnace grate, the stack having two flues. One flue tapered upward and the other downward, and the flues opened side by side over the grate, with openings of the same size. On lighting a fire on the grate, with unlimited access of air under it, the smoke was seen to issue nearly equally from the top of the two flues, but with an unmistakable preponderance in favor of the flue which enlarged toward the top. On partially shutting off the access of air to the fire, the difference became much more marked; the current in the flue tapering upward diminished, and finally stopped altogether, the smoke finding its way entirely through the flue with the wider top. Trials were then made to see whether the current in the flue

with the upward diminution could be restored by partly shutting off the other. A damper was arranged at the top of the wide-mouthed flue, and gradually closed; but even after nine-tenths of the orifice of this flue had been shut off, no current was started in the other, and it was only after the wide-mouthed flue had been closed entirely that the smoke began again to pass through the tapering one. We believe that the old theory is now made to conform to the facts by explaining that the friction of the smoke against the sides is much less in a chimney tapering downward than in one tapering upward; but, however that may be, there seems to be no doubt that the downward taper is more favorable, under ordinary circum-



AN ENGLISH COTTAGE—THE HALL.

mentioned by Juvenal in his "Satires," and we hear of it also, as a writer in the *Evening Standard* observes, from historians. It consisted of buying houses on fire. The speculator hurried to the scene, attended by slaves carrying bags of money, and others carrying tools, judged the chances of salvage, and made a bid to the distracted house owner, who was glad to accept anything, as a rule. The bargain struck in all haste, this earliest of fire insurers set his slaves to work and secured what he could. Sometimes even he put out the flames, and so made a *coup*. It was a business for capitalists, but the poorest who speculated in a small way could hardly lose if he had presence of mind enough to grasp the chances. Thus Cato the Elder, and, above all, Crassus, laid the foundations of their great wealth. The latter had a passion for such gambling. He gradually collected a force of carpenters, masons and such artificers—slaves of course—which reached 500 men. Not only did he buy houses on fire, but also, enlarging upon the common practice, he made a bid for those adjoining which stood in danger. His proposals were commonly welcome, we learn, so helpless were the people and so great the peril. By this means Crassus became the greatest owner of house property in Rome.

## The Taper of Chimneys.

The old rule about chimneys was that they ought to have the flue tapered to the top, on the theory that, as the hot gases in them ascended, they cooled, and, in cooling, contracted; and that it was important to reduce the size of the flue in proportion to the reduction

stances, than either a uniform section or one diminishing toward the top. What the most favorable rate of increase is does not seem to be yet determined. The foreign experimenter, whose report in the *Schweizerische Bauzeitung* has been extensively copied, thinks that an increase of diameter at the top of about one inch to one hundred and twenty-five inches in height of flue is not too much; and he considers that ventilation flues may, with advantage, be increased in capacity at a still more rapid rate.—*Amer. Architect*.

## PATENTS.

Messrs. Munn & Co., in connection with the publication of the *Scientific American*, continue to examine improvements and to act as Solicitors of Patents for Inventors.

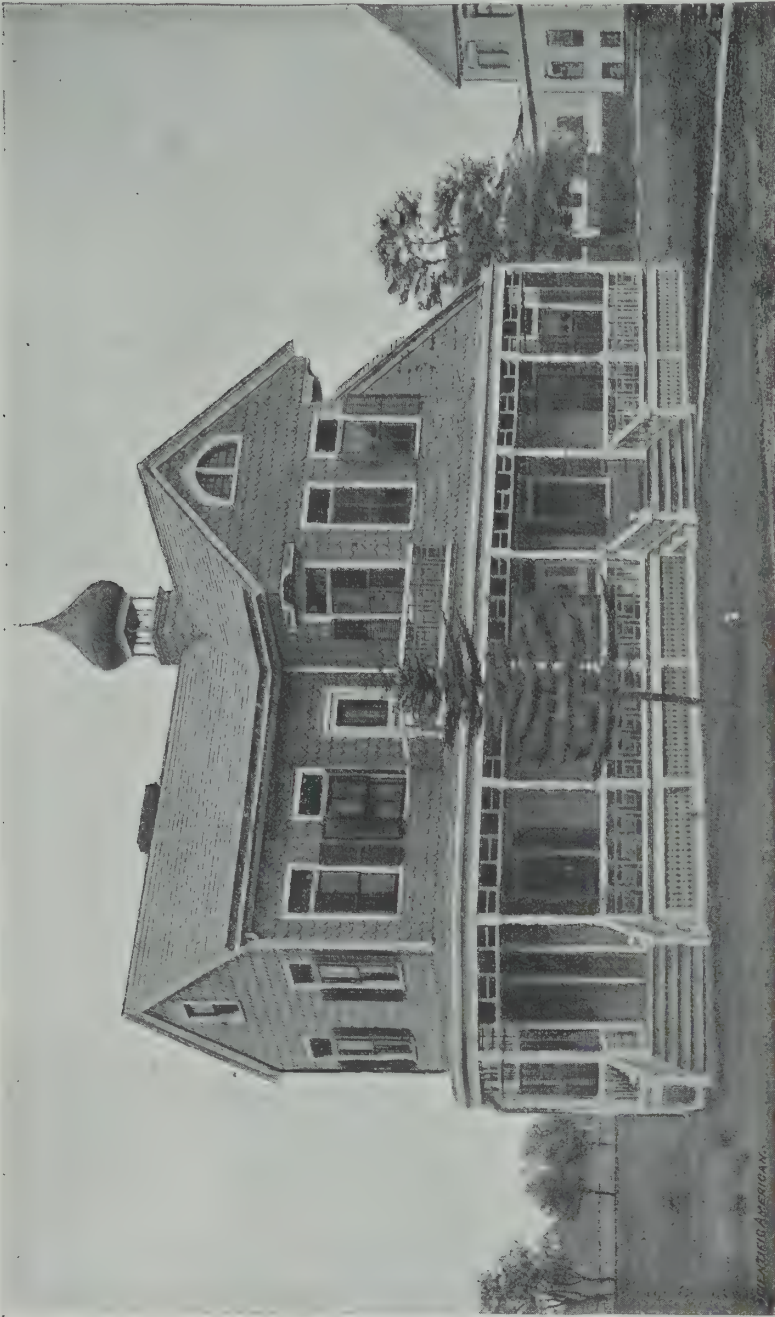
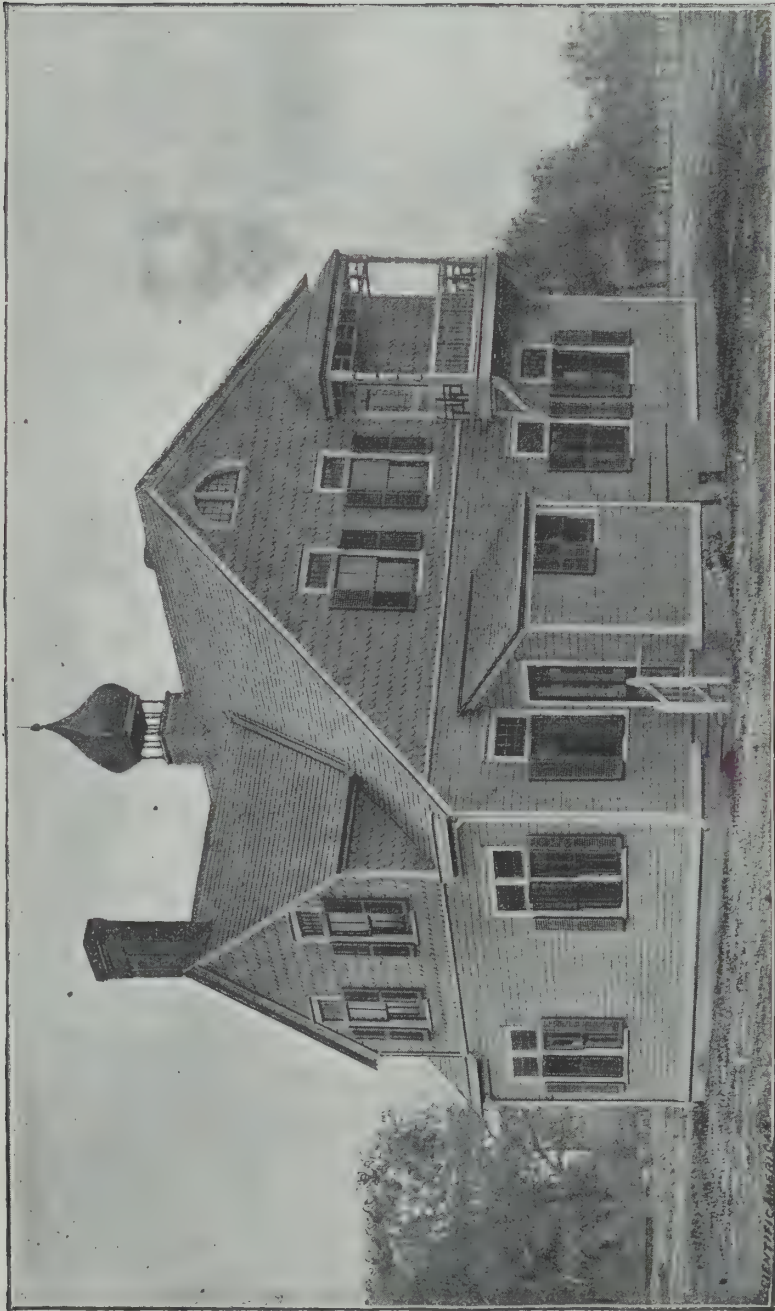
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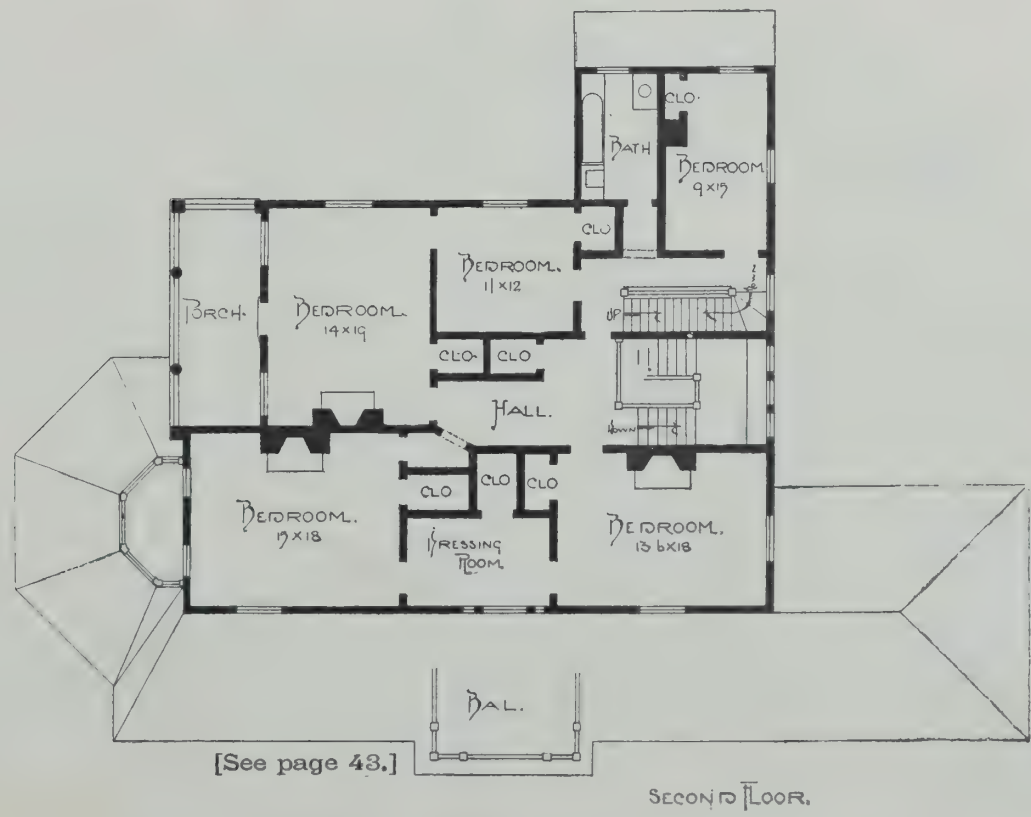
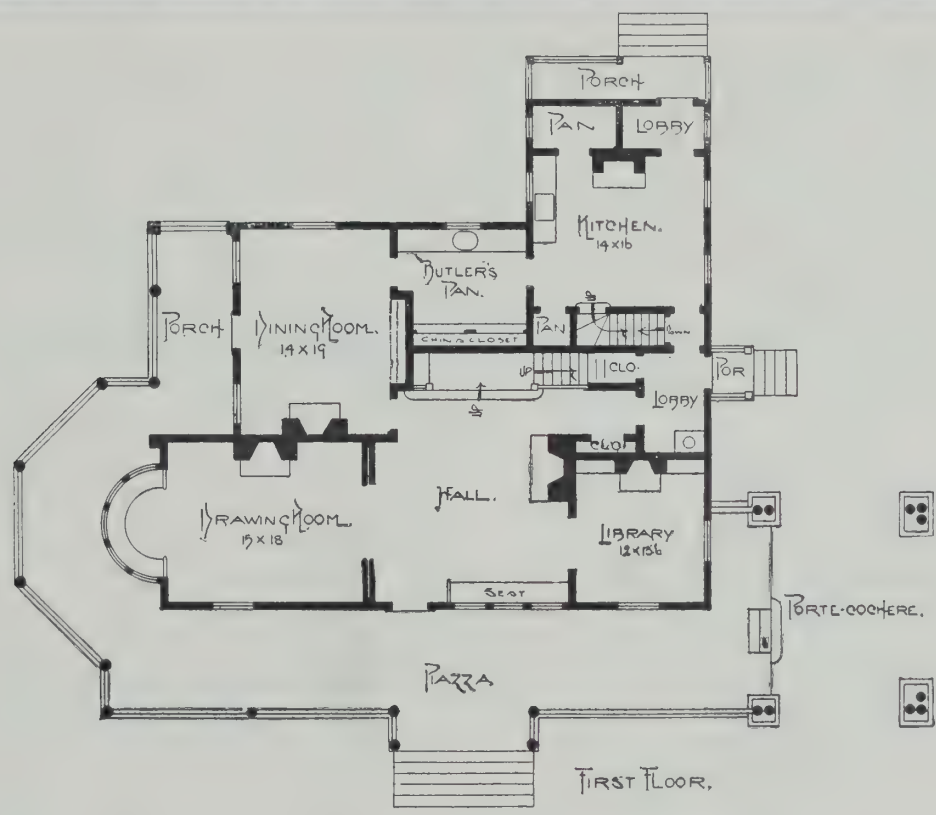




[See page 38.]  
A QUEEN ANN COTTAGE.







A RESIDENCE AT BELL HAVEN PARK.



## A RESIDENCE AT EAST PARK, McKEESPORT, PA.

We give herewith from the *Journal of Building* a sketch of the residence of E. E. Dearborn, Esq., at the above place. F. C. Sauer, Pittsburg, Pa., architect. It is a very satisfactory exterior design, and a glance at the floor plans shows a well arranged and comfortable interior. We estimate the cost of a house like this, all complete, at about \$4,000.

## Stained Cypress.

The use of cypress for interior work has heretofore been almost exclusively confined to a hard oil finish, and in some instances architects have objected to the color of the wood.

To meet this objection a local concern has recently been making some experiments in staining cypress, just as cherry, mahogany, and other first-class finishing woods are frequently stained to bring them to the desired color. Several pieces of cypress were given to a local factory, with instructions to finish them in as many different shades, and in the best manner possible. These pieces have just come from the hands of the finishers, and the results are in every way satisfactory. The workmen say that the wood takes the stain as well as any wood they have ever finished, and think there is not the least question about the durability of the color. Of course, this last is a question which time alone can

cypress when finished, but it brings out the grain of the wood more clearly, and its use will doubtless find favor among architects and builders.—*Timberman.*

## Low Ceilings.

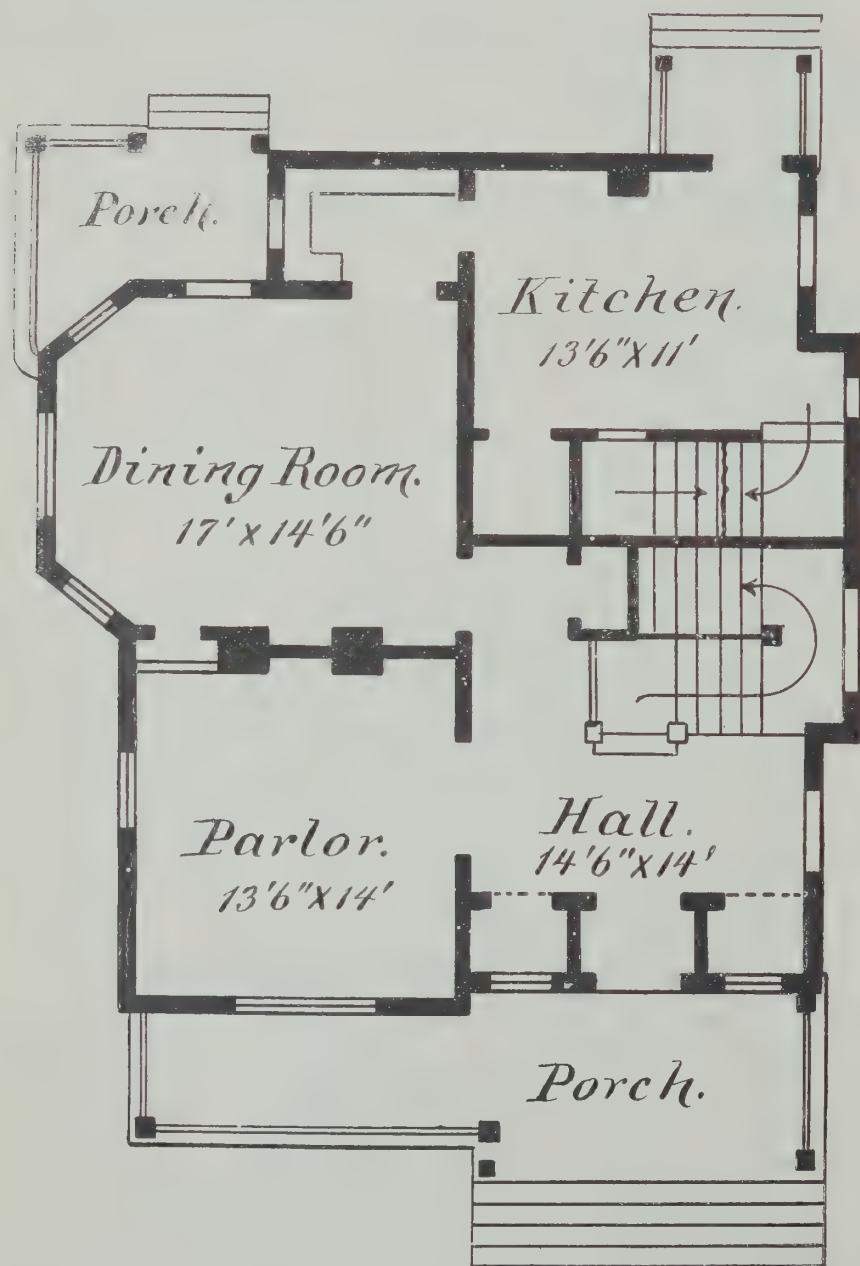
A reaction has lately taken place in favor of low

tific and hygienic, have not been lacking in support of low-ceiled rooms. Low walls to rooms, it is said, are being advocated in England as really affording better ventilation throughout, in preventing the formation of upper strata of all but immovable foul air, and tending to prevent draught. The idea is very gladly taken

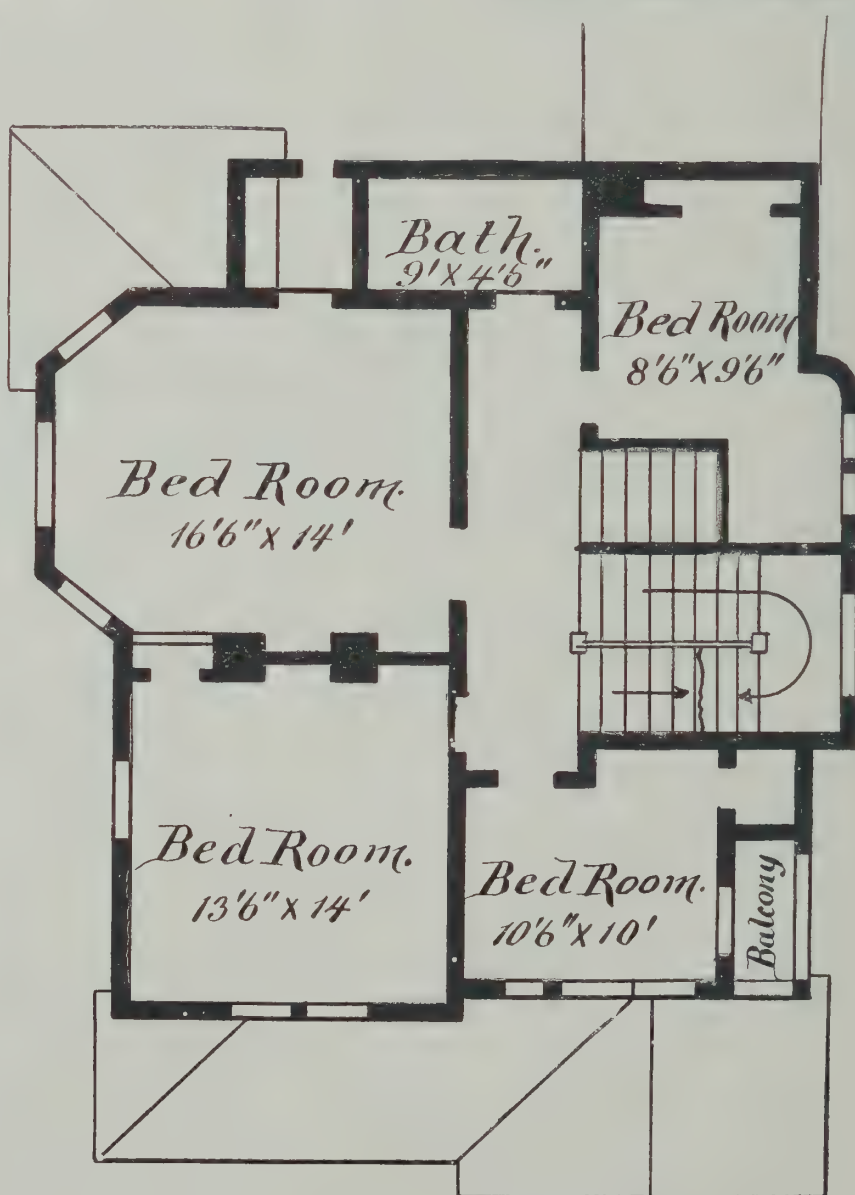
up by some of the art journals, who rejoice that we have probably gone to the extreme in the height of apartments, which has the disadvantage of dwarfing the furniture which is placed in them; which also fail to secure the most pleasing proportions to rooms not having any larger area. There is a coziness in a low-ceiled room which in a high-ceiled room is sacrificed to emptiness. In discussing this point reference is often made to the time of Queen Elizabeth and the low-wainscoted rooms that prevailed at that period. Low ceilings were the rule, and comfortable interiors rather than imposing exteriors were studied.—*Architectural Era.*



In connection with the publication of the BUILDING EDITION of the SCIENTIFIC AMERICAN, Messrs. Munn & Co. furnish plans and specifications for buildings of every kind, including Stores, Dwellings, Carriage Houses, Barns, etc. In this work they are assisted by able and experienced architects. Full plans, details, and specifica-



Plan of First Floor.



Plan of Second Floor.

## A RESIDENCE AT EAST PARK, McKEESPORT, PA.

definitely decide, but the possibility of the color fading or wearing off is a very slight one, and hardly worth considering in the face of the opinion of men with years of experience in finishing woods in this manner.

Finished in the natural color, cypress is often compared with pine in appearance, but when stained this resemblance is entirely destroyed, and there is no other wood with which a comparison can properly be drawn. The stain not only adds to the rich appearance of

ceilings. Not very long ago architects, sanitary engineers and physicians were almost unanimous in favor of high ceilings for rooms in dwellings. The arguments in support of lofty ceilings were numerous, some of them based upon the superior healthfulness of such rooms, and others upon the superior architectural effects obtained. With the introduction of the cottage style of architecture, ceilings have gradually become lower, and, the fashion having been set, reasons, scien-

tions for the various buildings illustrated in this paper can be supplied. Those who contemplate building, or who wish to alter, improve, extend, or add to existing buildings, whether wings, porches, bay windows, or attic rooms, are invited to communicate with the undersigned. Our work extends to all parts of the country. Estimates, plans, and drawings promptly prepared. Terms moderate. Munn & Co., 361 Broadway, New York.



AN IMPROVED WOODWORKING MACHINE.

The economical forming of baluster posts, mouldings, panelings and the various forms of ornamental woodwork which the architect and house builder now introduce so liberally in all handsomely finished structures, has become an object of very great importance, and several machines have been successively introduced to perfect this class of work, while reducing its cost to a minimum. One of the latest of these machines is shown in the accompanying illustration, together with various figures representing work done on the machine. It is the new fluting and twist machine made by P. Prybil, numbers 512 to 524 West Forty-first Street, New York City. It will produce all kinds of spiral or rope mouldings, either straight, tapered, curved or oval, making right, left, and pineapple cuts, and doing straight fluting. It will cut soft or hard wood from one to six threads on a piece, and make any degree of twist, from one turn in one and one-half inches of length to one in ten and one-half inches. The cutters are similar in shape and arrangement to those used on variety shapers, and are made of the same steel. They are held between collars that are somewhat similar, but so arranged that the knives have a peculiar action, cutting from the outside in, and making a smooth cut, even against the grain. They revolve always in the same direction, whether the twist be right or left, and one set will produce several different shapes of work. This machine will swing eight inches, and will take 60 inches between centers.

A medallion fluting attachment will produce radial fluting on flat work up to 9 inches square or 6 x 12 oblong. This fluting can be either perfectly flat or can be swelled or waved. It can run direct to the center or tangent to a central circle.

A very handsome class of screen work, known as the "Moorish" pattern, consists of long, thin spirals, interwoven like wire netting. The spirals for this work are generally considered very difficult to make, the trouble being to support the long light sticks against the cut. This machine is designed to make this light work as well and as rapidly as it does the heaviest.

A FINE MACHINE FOR CABINET SHOPS.

The machine shown in the illustration, made by Messrs. Frank & Co., of Buffalo, N. Y., is designed to plane 30, 36, and 42 in. wide and 6 in. thick, on one side only. It has two top cylinders, one to do the rough work and the other for polishing. The roughing cylinder is belted from both ends, the other from one end. Two knives are used on each. The heads are made from steel forgings and lipped to prevent tearing the lumber. The bearings are all 2 in. diameter and 8 in. long, except the one on finishing head

next to driving pulley, which is 12 in. long. The finishing cutter head is set 1-32 in. below the roughing head, and as all the dirt, etc., is taken off by the first head, the knives remain sharp for a long time. One can feed this machine 50 lineal ft. per minute, and do the

be taken up by a strong gib at each end of the machine. The bed is raised and lowered by means of two 1 1/4 in. square thread steel screws, 4 threads to the inch. The machine must be belted from above, and a countershaft with our improved self-oiling brass-bushed loose pulley is furnished with each machine. Three speeds of feed are furnished with each machine. Floor space required, 6 by 8 ft. Weight of machine, 3,500 lb. Countershaft has 12 by 6 1/2 in. tight and loose pulleys and should run 1,000 revolutions per minute.

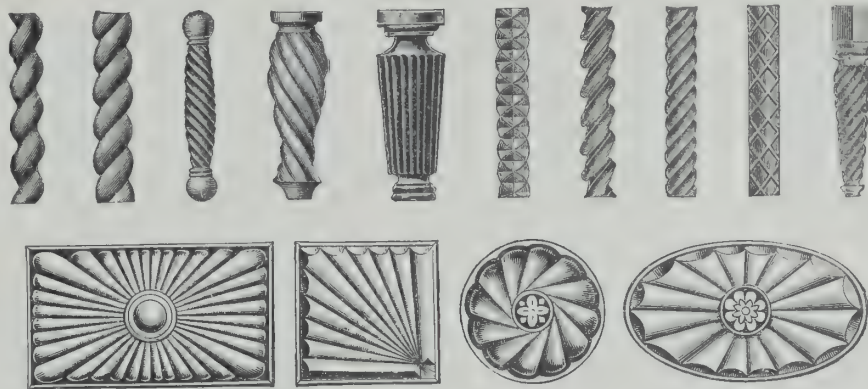
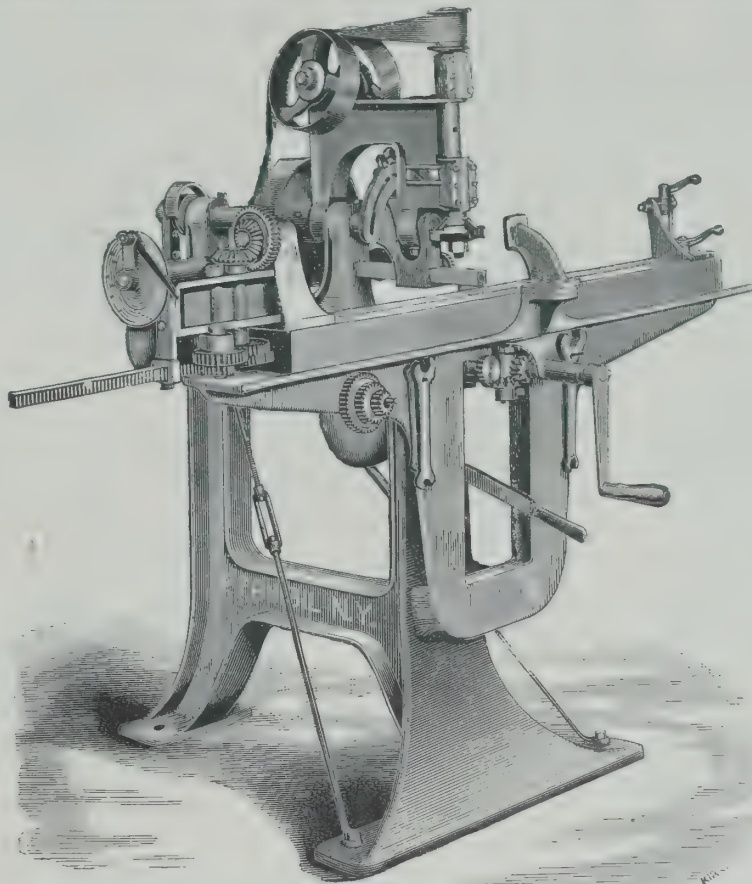
Swezey's Dumb Walter.

This is a style of waiter which has met with great favor during a long period of years. It is not likely to get out of order, and runs easily. The car is held in position at each story by an automatic catch. It is manufactured by M. B. Swezey, No. 120 Twentieth Street, Chicago, and is highly recommended by leading architects, builders, and house owners.

Graphic Representation of Strains.

The vertical shearing stress of a beam at any point is known to be equal to the weight on the next pier less the weight lying between this pier and the point. It is generally represented graphically for each point by ordinates to the line of beam on one side only. Now, as the sum of these stresses must be zero, those on one side being positive and those on the other negative, the proper graphical representation is to show them according to these signs above and below the line of beam. This leads to a simple geometrical construction for finding the shearing stress when the beam is loaded in any way with a number of weights, single or distributed. Find the line of shearing stress for the beam itself; then, using this line, plot on it the line of shearing stress for the first weight, making the ordinates vertical to the line of beam itself. Plot from this second shearing line a third shearing line for the second weight, and so on. The shearing line last found gives the stresses arising from the weight of the beam and the weights for each point. The construction gives the line of shearing stress at each step and for each weight also. When the shearing is a maximum, the bending moment is zero, and where the shearing stress is zero the bending moment is a maximum; consequently, that point where the line of shearing stress intersects the beam is that of the greatest bending moment. The areas between the line of beam and the line of shearing stress above and below are equal.—*The Architect.*

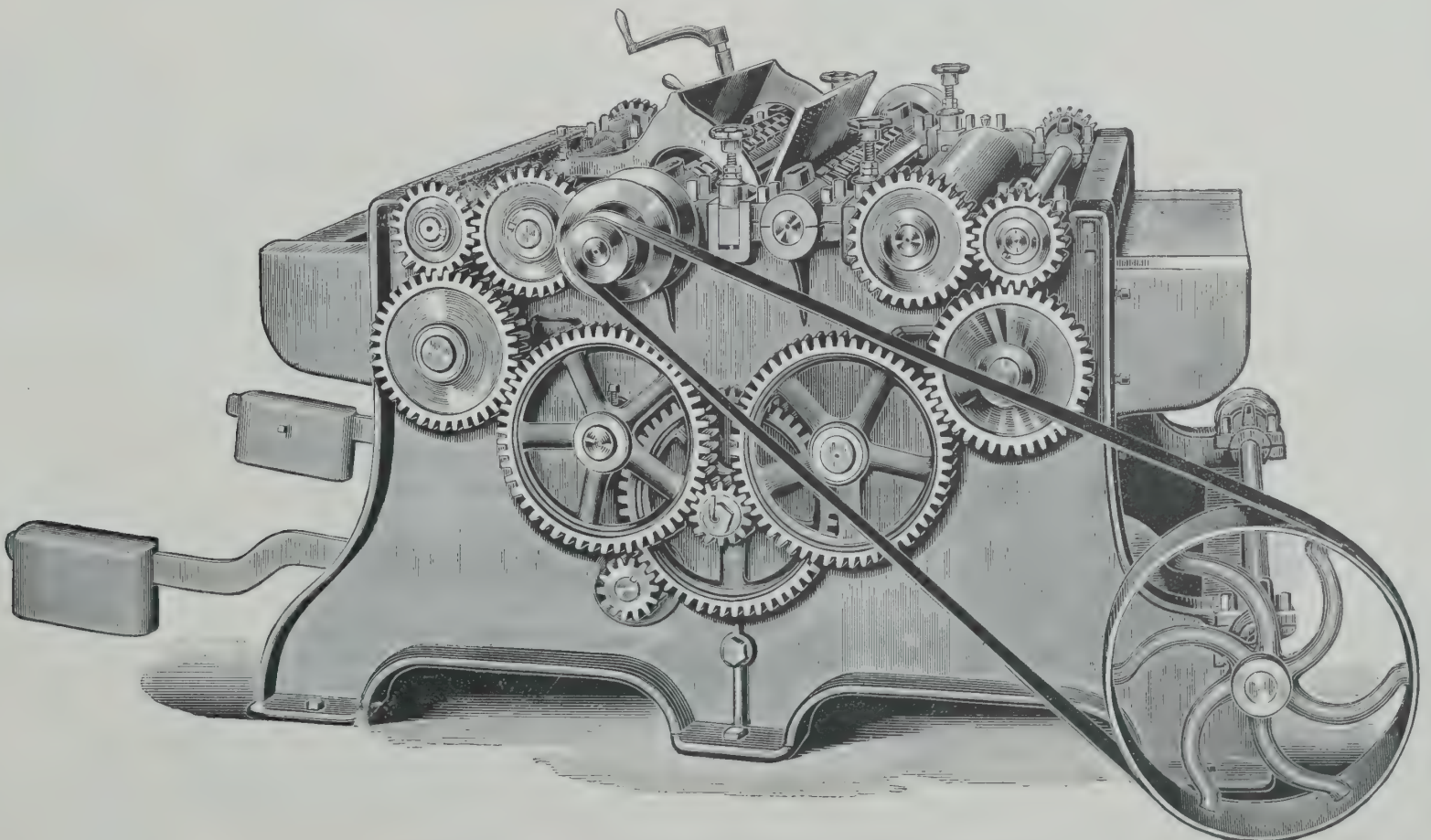
PEPPER was known to the ancients. In the middle ages it was one of the most costly of spices, a pound of it being a royal present.



AN IMPROVED WOODWORKING MACHINE.

finest kind of work, and by using a slow feed the doors for cabinet work, etc., can be planed as well as on a diagonal planer. This makes it a very desirable machine for a door factory as well as a cabinet shop. Both heads have yielding chip breakers or pressure bars on each side of the heads, which helps to secure perfectly smooth work. The feed rolls are 4 1/2 in. diameter, and all driven. The bed is cast in one piece and set into the frame 1 1/8 in. deep, and all play can

quently, that point where the line of shearing stress intersects the beam is that of the greatest bending moment. The areas between the line of beam and the line of shearing stress above and below are equal.—*The Architect.*

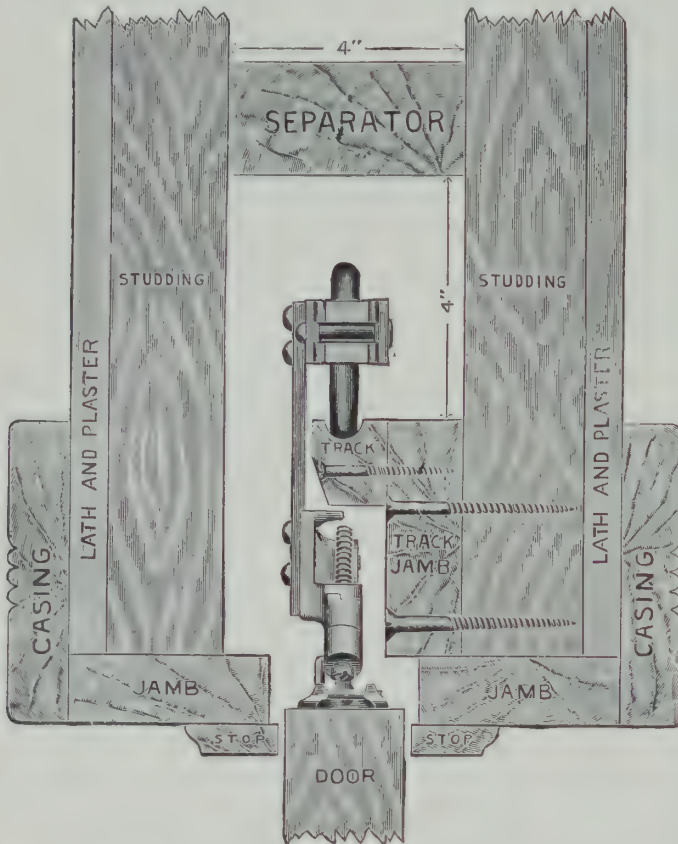


FRANK & CO.'S CABINET PLANER AND POLISHER.



## AN IMPROVED DOOR HANGER.

The hanger shown in the accompanying illustration is adapted for use with either heavy or light doors. It is the fourth invention of Mr. Warner in this line, has anti-friction bearings, is adjustable and noiseless, and the track is of hard wood. It has an automatic gravity lock. In hanging, after the base plate is screwed in place, the door is coupled to the hanger by simply sliding the parts together, when the gravity lock, of its own weight, falls and locks them in place. Having but a single track, the carpenter has but one partition to



THE NEW WARNER SINGLE TRACK DOOR HANGER.

set true, and the hanger adjusts itself to any unevenness in the track. This hanger is manufactured by the Warner Manufacturing Co., Freeport, Ill.

## A NEW WOODWORKING MACHINE.

The machine shown in the illustration is one of the latest productions of the Indiana Machine Works, Fort Wayne, Ind. It is designed for use in sash, door and blind factories, planing mills, job shops, etc. A smaller one is also made for furniture making and is styled the No. 3. The base is cast in one massive piece, has a substantial floor support, and is necessarily much more rigid than were it bolted together. As operators use their hips in connection with their hands in pushing carriage across slides, an opening is left in top of base, so that there is nothing to interfere with his using his side should he see fit to do so. The arbor housing is fitted to planed surfaces, and is abundantly heavy for every purpose. The arbor frames are fitted on dovetail ways with provisions for wear, their bearings being long and far apart. The arbors are of large diameter, and run in extra long boxes. They carry two steel heads each, that will cut out a tenon seven inches long, and by our patent adjusting device both heads may be adjusted separately or together and without altering the space between them. The upper head has an over-cut movement, so that a tenon may be made longer on one side than on the other.

The cope heads are made of gun metal, and are accurately balanced. They are fitted to arbor frames, so that when heads are adjusted they go with them. Independent adjustments are furnished for these heads, all of which are easy of access. The cope countershaft is

firmly fitted to machine, and placed in such a manner as to allow the use of extra long belts.

The carriage is made in one piece, and although very rigid, works with the greatest ease and comfort to the operator. It is provided with gauge rod and stop by which the work may be gauged. The table is very wide, and runs on extra long slides with flat and V ways.

## The Baths of Diocletian.

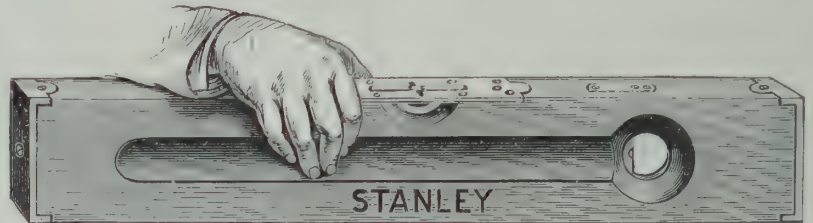
The magnificent bathing establishments, called *Thermæ*, to distinguish them from the ordinary baths in Rome, consisted of a long series of halls, chambers, and courts, all lying on the same level, so that the extent of surface required for laying out had to be artificially constructed either by the removal or elevation of the soil. The *Thermæ* founded by Diocletian and Maximian, and completed by Constantius and Maximin, was the largest edifice of this kind. At present only the great hall, converted into a church by Michel Angelo, exists in a state of tolerable preservation. As the massive granite pillars, though so sunk into the ground that their full height is nowhere visible, are still standing, the antique, vaulted roof has also been preserved entire. This circumstance is of great importance for the lighting up of this vast space, the masses of light falling upon it at so favorable an angle that the mind receives the same pleasing impression at all hours of the day and at all seasons of the year. Several considerable portions of the adjoining halls are still to be seen, but being included within the buildings of the neighboring convent, a clear and complete survey of them cannot easily be obtained. A system of buildings of this species cannot be made intelligible till we have had the opportunity of examining the ruins of the *Thermæ* of Caracalla, these ruins not having been disfigured by any modern additions. The wide,

open space behind the *Thermæ* of Diocletian was not built over in ancient times. We must picture it to ourselves as simply surrounded by walls. At the extreme ends of these, on the side nearest the city, circular buildings were erected, one of which has since been converted into the church of St. Bernardo. The space extends in the form of a half circle. Here must have been erected the seats for the spectators who wished to be present at the exercises of the palaestra held in court. In order to form a level surface so extensive considerable substructions must have been required here, such being absolutely necessary for this semicircular enlargement of the court. The church of St. Maria degli Angeli, with its high gables, makes an imposing impression in the distance, and is,

perhaps, the only edifice in Rome capable of giving us a lively idea of the solemn aspect of this species of ancient buildings. The masses which here meet our view differ essentially from those of the facades of modern churches, inasmuch as they have an actual reality, are of a more constructive character, and announce themselves as what they are; while the latter rather conceal than display the true significance of the building which they ostentatiously adorn, and serve rather to perplex than to regulate our conception of the concrete idea which had thus created for itself an organic external form. From their elevated situation, these *Thermæ* are visible from almost every spot in ancient Rome commanding an open prospect, and are, therefore, peculiarly adapted to serve as a landmark for the stranger amid the world of ruins.—*The Architect.*

## THE STANLEY PLUMB AND LEVEL.

A new feature in levels is shown in the accompanying illustration. It is the introduction of a shallow groove lengthwise of the two sides to the wooden stock, giving



STANLEY'S PATENT HANDY PLUMB AND LEVEL.

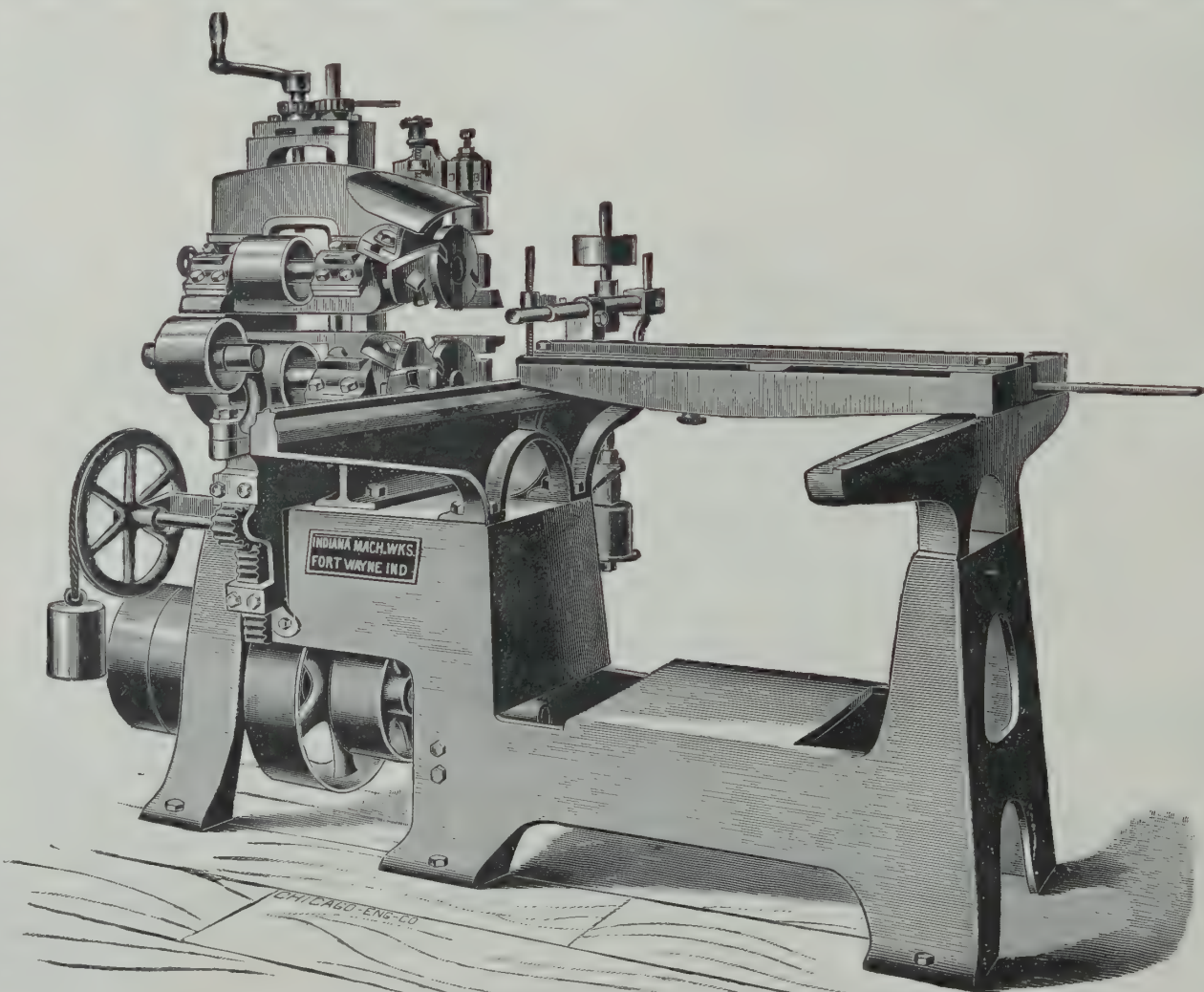
better means of grasping the tool when used for leveling or for ascertaining a plumb. This level has just been added to the assortment made by the Stanley Rule and Level Co., New Britain, Conn.

## The Diamond Match Company.

That wonderful combination known as the Diamond Match Company recently held a meeting of its stockholders in Chicago. Of the 60,000 shares of the company, 44,205 were represented. Vice-President Moore said that during 1891 the company had earned \$200,000 above its dividends and interest charges, and its business for the ten years beginning with 1881 showed an increase of 128 per cent. He therefore urged an increase of the capital stock from \$6,000,000 to \$7,000,000, as the purchase of additional pine lands and improvements of the company's plants had been required by the exigencies of the business. J. H. Comstock, who has charge of the company's lumber interests at Ontonagon, Mich., gave an extended account of the situation there. The location of the company's holdings is such that it virtually controls the lumber trade of the river, and it is likely to be called upon in the near future to handle and saw all the lumber floated down the stream. Of the present pine timber holdings of the company, he estimated that it had enough for five years' consumption at present rates; recent contracts for new purchases would increase it to twenty more. The section in which the pine lands of the company were situated had suffered some from forest fires during the year, but the holdings of the company were pretty well scattered, and the loss to it would be light, most of its timber scorched being for the most part available.

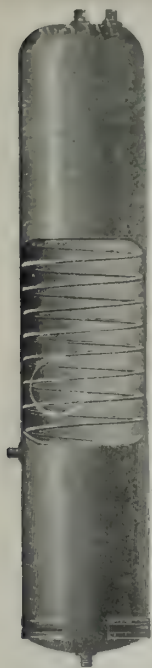
The following officers were elected: President, O. C. Barbour; Vice-President, William H. Moore; Treasurer, J. K. Robinson; Secretary, H. C. Cranz; General Manager, W. M. Graves.

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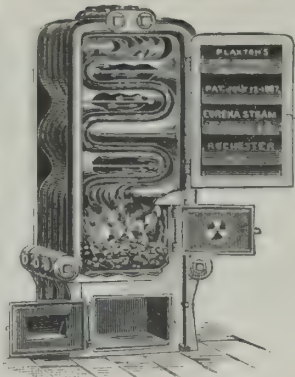
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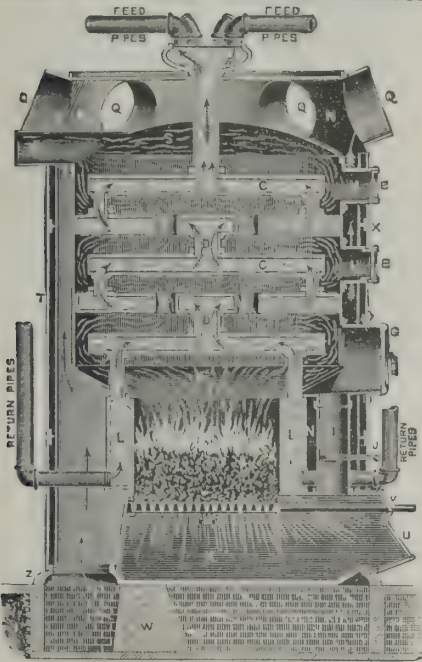
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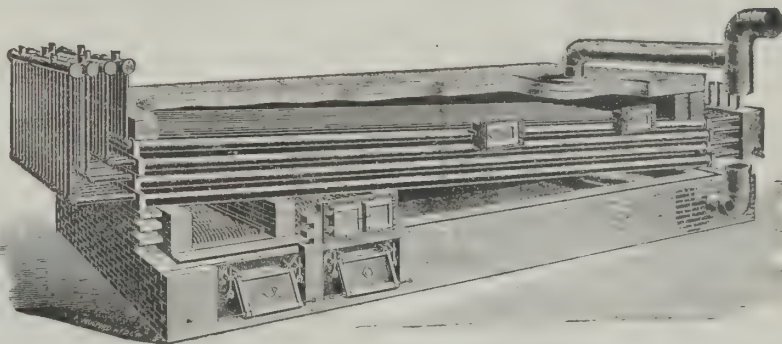
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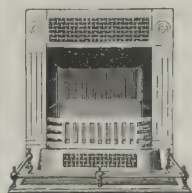


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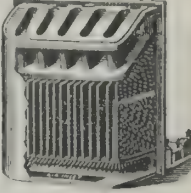
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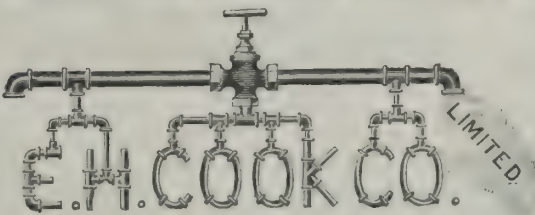
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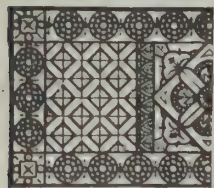
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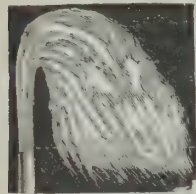


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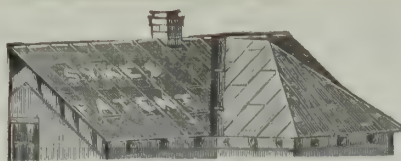
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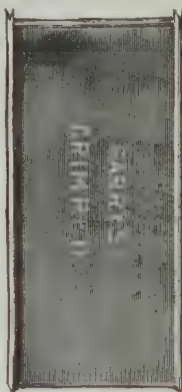
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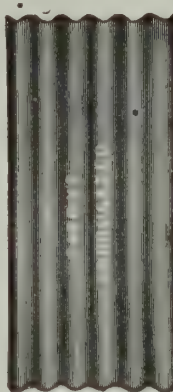
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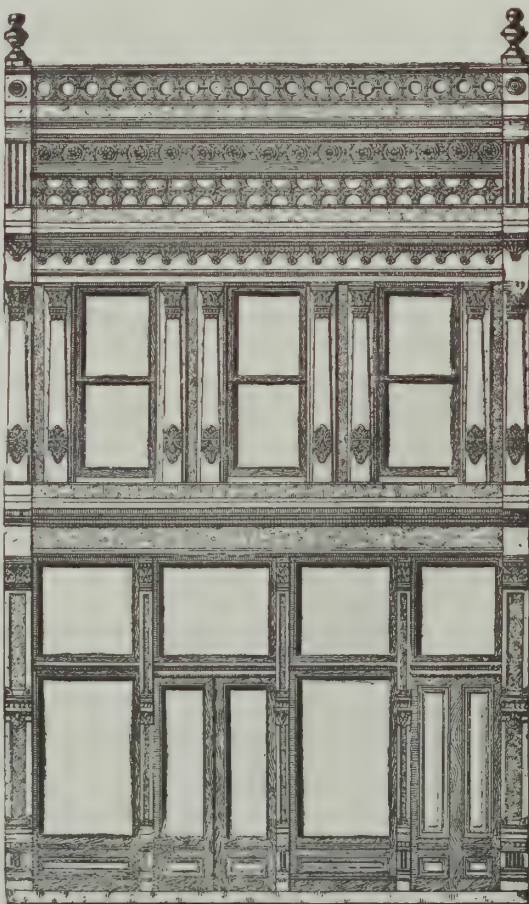
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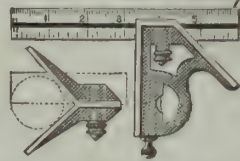
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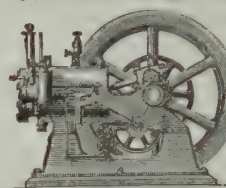
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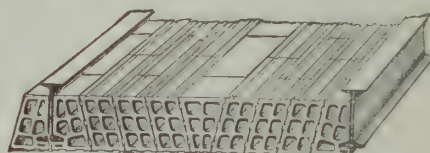
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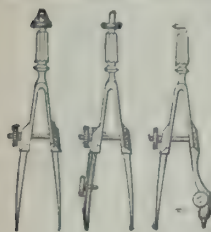
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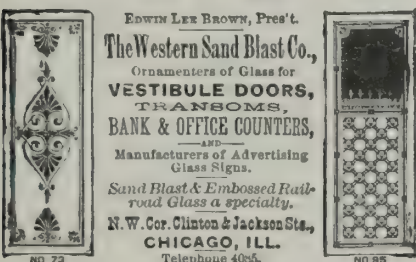
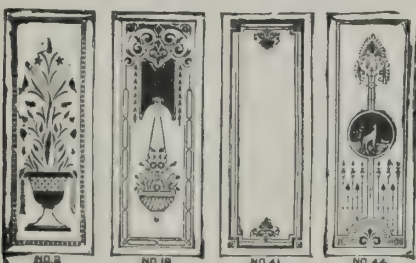
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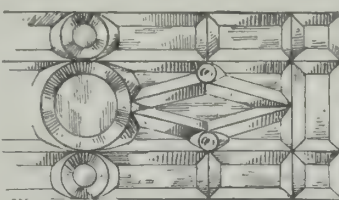
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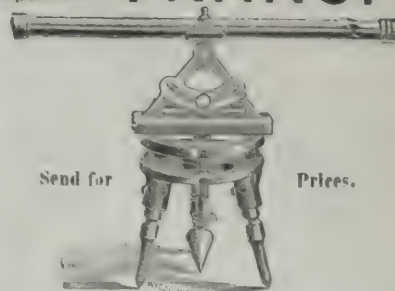
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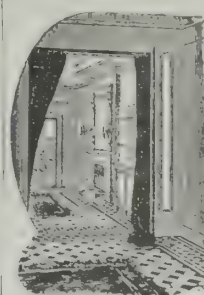
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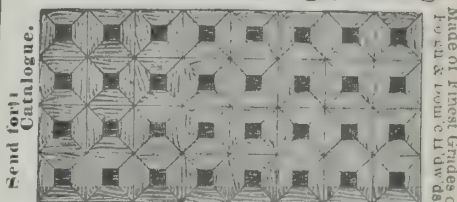
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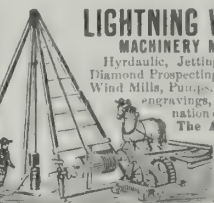


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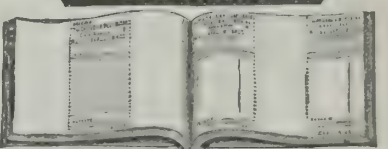
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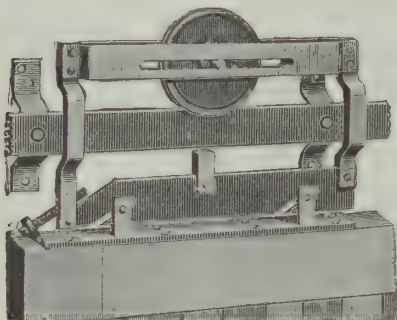
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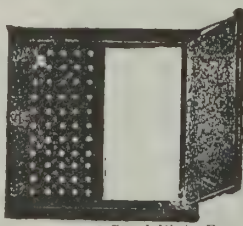
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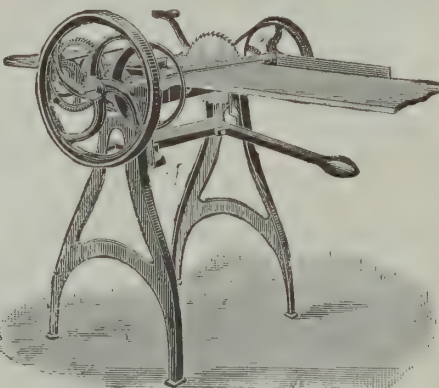
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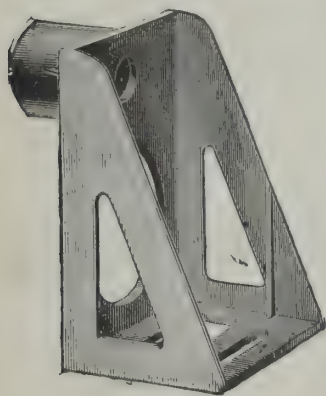
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PUT INTO THE WHITE HOUSE BY THE U. S. GOVERNMENT.

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For Wash-Bowls, Sinks, Bath and Wash Tubs, West Cleveland, Ohio.

Cudell Anti-Siphon Trap.



Adjustable for 1/2, 3/4, & R

For venting, use vented outlet.

(Continued from page iv.)

(3) R. M. C. says: The water of my driven well contains small particles of sand. The pump discharges about ten gallons of water a minute. Can you inform me as to what is the best method to filter the water free from sand? I have tied cloth bags over the discharge pipe with but partial success, as some of the sand works its way through, and in addition a strong back pressure is given to the pump. An ordinary filter quickly overflows. Possibly you may know of some kind of cloth filter or other method which will collect the sand. (About a spoonful of sand to 100 gallons.) A. We can only recommend pumping into a tank large enough to allow the sand to settle by the slow movement of the water across its length. For the quantity that you state a mere trough a foot in diameter and depth and 5 or 6 feet long, with the water flowing into one end and out at the other, should allow of complete settlement of the sand, which could be occasionally cleaned out. Any filter of ordinary size will soon clog. We suggest also that the drive pipe strainer is too coarse. It might well pay to put down a new drive pipe with an extra fine strainer.

(4) P. J. H. asks: 1. What is an automatic cut-off? A. An automatic cut-off is one controlled by the engine or any irregularity in its work, and is made variable by the mechanism of the valve gear. 2. What is a variable cut-off? A. A variable cut-off is a regulating device to make any required fixed cut-off on ordinary valves by varying the position of the riding valve by means of an adjusting spindle projecting outside of the steam chest. 3. A tank of water with a 20 foot head has a one inch pipe 4 inches long screwed in its bottom; what is the discharge per second? Three of my friends have tried it. One makes it 11 gals. per second. Another 23 gals. per second. The third has it at 180 gals. per second. I respectfully submit my way of working it out, which I am told is Haswell's rule. Multiply the square root of 64-333, and the depth of the center of the opening from the surface of the water, by the area of the opening in square feet, and this product by the coefficient for the opening. The whole product will give the discharge in cubic feet per second. Multiply this by 7.48 for the number of gals. per second. A. The rule is correct, but your figuring is defective. You should use the area of a 1 in. pipe instead of a square inch, or 0.00545, and a coefficient of 0.77. We make the discharge 11 1/4 gals. per second.

(5) J. C. A. asks whether more coal will be required to heat a greenhouse 245 feet long, by steam, with the boiler at one end than if it is at the center of house. A. There should be no difference as to the gross amount of heat imparted to the greenhouse, but it might make a great difference in the uniformity of distribution of the heat. The position of the greenhouse in regard to the direction of the cold winds, in a house as long as stated, will make a great difference in reference to the position of the boiler, which, for best effect, should be placed at the end most exposed to cold winds. Otherwise a central position on the northerly side is the best practice.

(Continued on page viii.)

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This Company is the original operator in the Bangor Valley, and continues to manufacture the **BLUE ROOFING SLATE** which has become so celebrated for fineness of texture and uniformity of color.

The special attention of **Architects and Builders** is called to the fact that this Company has perfected a system of preparing slates with Sawed Edges, of suitable size, and curve of any radius, either convex or concave (as shown by the twelve figures in the engraving), to cover towers or domes, and guarantees perfect results where working drawings and full specifications are furnished.

The Company is also prepared to fill orders for Mill Stock of every description, such as Mantel Stock, Steps, Risers, Hearths, Window Sills, Floor Tiles, and Ridges.

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# New York Safety Dumb Waiter

The simplest, most durable and economical waiter ever made. Lifts easily fifty to seventy-five pounds. Made in one size only and will fit any size opening under twenty-four inches square.

Price of fixtures alone, **\$15.00 per set.**  
Packed one set in a case.

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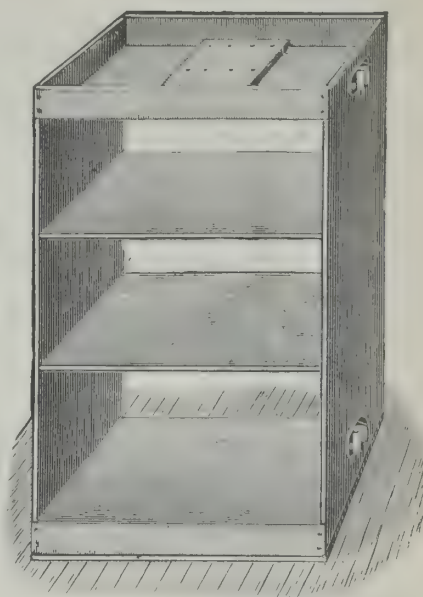
For use with New York Safety fixtures, is built of whitewood with two stationary shelves. Made any size from sixteen inches to two feet square.

## NEW YORK SAFETY DUMB WAITER FIXTURES

Complete with No. 1 Car, all ropes, weight runs, guide runs and counter weight ready to erect, for first ten feet in height, \$40.00. Each additional foot in height, 40 cents.

We also make a full line of Heavy Dumb Waiters, Hand Power Elevators, Invalid Lifts, Carriage Elevators, etc. Capacities from fifty to four thousand pounds.

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It is the highest business building in the world, is constructed of fire-proof materials, and is plastered throughout with Adamant.

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It has 800 per cent. more tensile strength than lime; it is fireproof; will not cleave in case of leakages; saves weeks of time in finishing buildings; does not swell or shrink; does not ruin woodwork by saturating it with moisture; does not obstruct the streets with sand and mortar beds, and, in every way, is superior to all other plastering materials.

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(WATCH THIS SPACE NEXT ISSUE.)

I AM ADVERTISING FOR YOUR BENEFIT AS WELL AS MY OWN.

If you patronize me your pocketbook will be replenished. This is a progressive age. Building enterprise is widespread. Cheap and durable building material is a public demand. **It is needed in every town and city in the United States.** After twelve years of experience in the construction of cement sidewalks, and after testing all of the different kinds on the market, I have succeeded in making the best sidewalk **ON EARTH**, and now offer a pavement that is absolutely unexcelled in durability, and unapproachable in beauty.



## I GUARANTEE TO MEET COMPETITION IN PRICE.

In every city and town brick and wooden walks are fast disappearing, and are being replaced by the popular walk of the day, one made of Portland Cement. The opportunities for this kind of work are as thick as the **STARS IN THE SKIES**, while the expense of manufacture is practically as cheap as the **SANDS IN THE OCEAN**. Any enterprising young man of **determination** who will forward me \$25.00 will receive my printed instructions, in brief form, setting forth my process, so that he can soon master the art of making it. He will be rewarded handsomely for his expense and labor and will have a trade that will make him from \$2.50 to \$5.00 per day for his personal services. I send skilled labor from this city to put down the sidewalks, and arrangements can be made with responsible parties to start the business in their own city, use my process, and divide profits. **My reference is the work I have already done in almost every city throughout Central, Southern and Western Illinois, including this city, Springfield, Jacksonville, Quincy, Paris, Litchfield, Champaign, and Monticello.** I refer you to the Mayor of each respective town. Enclose stamp for catalogue. When applying for agency, state population of your town.

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MANUFACTURER OF

ARTIFICIAL STONE FOR SIDEWALKS AND BUILDING PURPOSES.

THORN'S PATENT METALLIC ROOFING  
TILES and SHINGLES.The Best, Most Handsome, Durable & Secure Roofing Plates  
YET OFFERED TO THE BUILDING TRADE.INDORSED BY ALL THE LEADING ARCHITECTS.  
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MUNN &amp; CO., Publishers,

"SCIENTIFIC AMERICAN" Office, 361 Broadway, N. Y.

(Continued from page vi.)

(6) J. McD. says: When the hot water faucet at sink is opened, a great rattling noise is produced in boiler, which is of copper, 40 gals., and continues until faucet is shut off again, then producing a sudden sharp click in boiler; all is quiet until hot water faucet is used again, when the above is repeated; pipes to water back in range are all run correctly and are not trapped. Hot and cold water pipes run down from sink, then under kitchen floor, 20 feet horizontally, then vertically 40 feet to other fixtures, remaining separate all the way and not joining at top. Can you suggest a remedy? A. The noise is caused by the sudden vibration of steam in the water back, caused by the reduced pressure in the water when the faucet is opened. The steam rushes into the boiler through the circulating pipe, where it comes in contact with the cooler water, and suddenly condenses with a hammering noise. A larger cold water inlet pipe from the street, and an air chamber, will be a partial remedy; perhaps the street pipe is partially closed, which is often the case where galvanized pipe is used. This will cause the hammering.

(7) J. B. says: Kindly answer through *SCIENTIFIC AMERICAN* what causes clicking in pipes when steam is turned on? Give scientific explanation and remedy. Why would not it be a good idea in order to increase the speed of our fast boats, to have oil forced out at the bow and keel? This would naturally rise and envelop the hull, forming a film of oil for the boat to ride on, thereby reducing the friction of the water. Give a scientific explanation of how electricity makes a motor revolve. Give suggestions of some simple way of heating water closets in this cold climate. A. The noise in the pipes is caused by water hammer. The steam is rapidly condensed in the cold pipe, and is thrown against the pipes, elbows or bends by the velocity of the steam through them. The water also accumulates in small masses, which are dashed against each other; this in a confined space like a pipe produces a hammering noise. Your suggestion is good, but expensive. Air has been tried on a steamboat in New York Bay, but did not meet expectation. A motor is driven by maintenance of poles in the armature attracted or repelled by the field magnet poles. We suggest that you move the water closet into the house, or put up a stove.

(8) G. E. S. says: We have more or less cold water pipes (iron) throughout the mill, used for hydraulic pulp machines. We are annoyed by the sweat and drip from these pipes. What can they be coated with on the outside to keep them from sweating and dripping? A. The sweating and dripping from the pipes is caused by the contact of the moist warm air in mill with the cold pipe. The only remedy is protection by a non-conducting substance, and may be any of the felting material in use. Hair felt 1 inch thick, covered with thick paper, is very effective; or if thought cheaper, box the pipes and fill with sawdust. Make the boxes to have not less than 1 inch clearance on inside between box and pipe.

(9) E. T. S. asks how to clean wall paper. I have a large hall that I wish to clean. The hall is 100 by 50 feet. The paper is in good shape, only soiled by dust. A. There is no better way of cleaning papered walls than to wipe them down with soft cotton cloths, better by hand, but can be done with a long handled brush to remove the loose dust and then go over with a cloth tied over the brush. For stains use fresh bread crumbs.

(10) H. A. asks: 1. If there is any one at present experimenting with calked cast iron pipes for the use of steam. If so, what is the result? A. Cast iron pipe with calked joints is not used for steam at any pressure. It does not remain tight but a short time, owing to expansion and contraction by the heat of the steam. 2. Will a 4 in. cast iron pipe as above stated stand a pressure from 10 to 25 lb.? If not, what is your idea of making use of the said pipes for the circulation of steam? A. The pipe will stand the pressure, but the joints work loose when made with lead. Would stand better, if with rust joints, for a short time. Thin cast iron pipe of this class with rust joints is used for hot water heating when there is but slight pressure.

(Continued on page xii.)

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Under the head of Cleansing over 500 recipes are given, the scope being very broad, embracing the removal of spots and stains from all sorts of objects and materials, bleaching of fabrics, cleaning furniture, clothing, glass, leather, metals, and the restoration and preservation of all kinds of objects and materials.

In Cosmetics and Perfumery some 500 receipts are given.

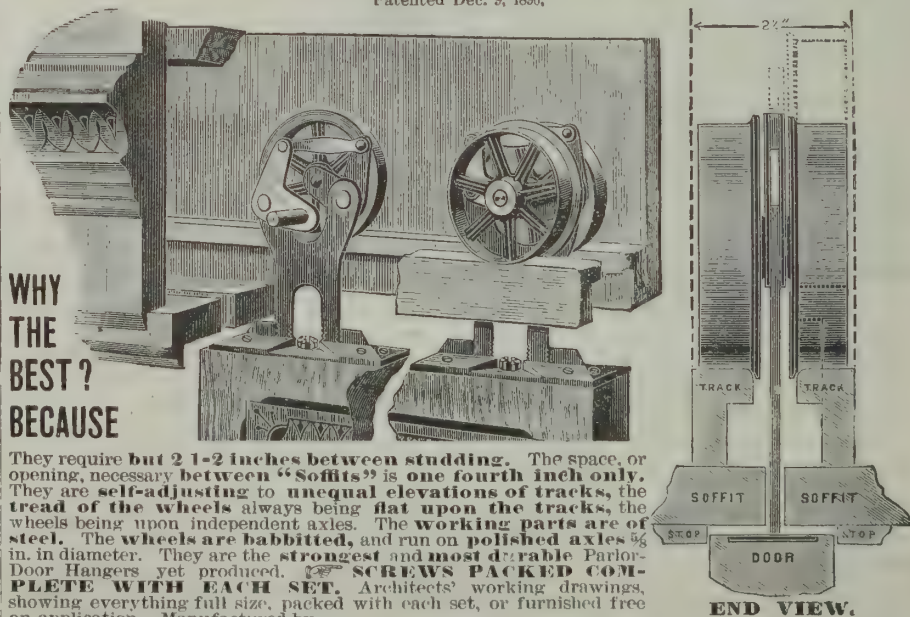
Soaps have nearly 300 receipts.

Those who are engaged in any branch of industry probably will find in this book much that is of practical value in their respective callings.

Those who are in search of independent business or employment, relating to the home manufacture of sample articles, will find in it hundreds of most excellent suggestions.

## THE "COLTON" SLIDING DOOR HANGER.

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They require but 2 1/2 inches between studding. The space, or opening, necessary between "Soffits" is one fourth inch only. They are self-adjusting to unequal elevations of tracks, the tread of the wheels always being flat upon the tracks, the wheels being upon independent axles. The working parts are of steel. The wheels are babbitted, and run on polished axles 3/4 in. in diameter. They are the strongest and most durable Parlor-Door Hangers yet produced. **COMPLETE WITH EACH SET.** Architects' working drawings, showing everything full size, packed with each set, or furnished free on application. Manufactured by

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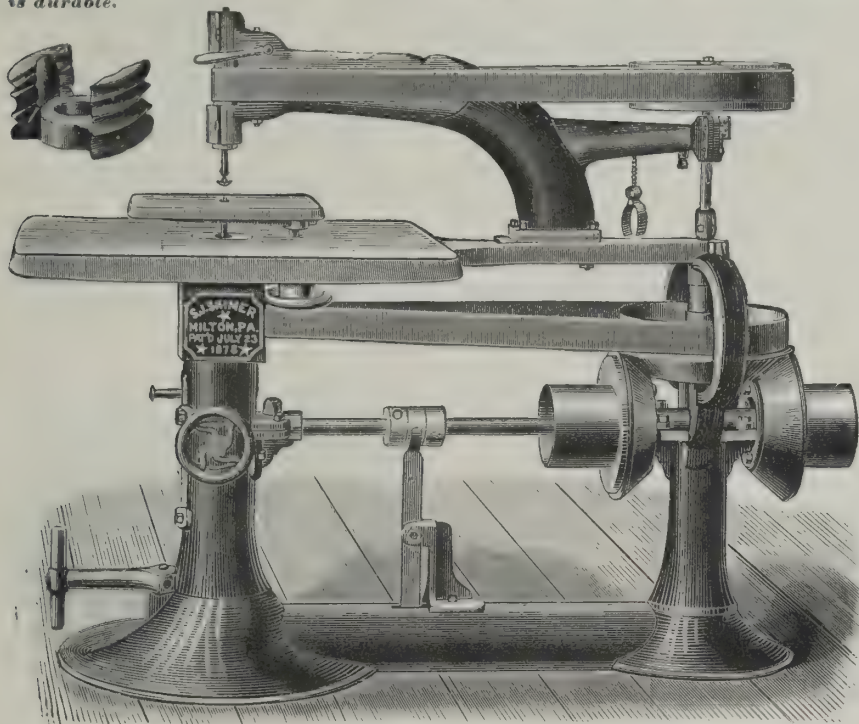


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You never tire of the make-up of this Machine, which is as simple and effective as it is durable.



Reversible Cutters for any shape of mould made to order, and warranted to cut free and easy. For Circulars and full information, address,

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85 Devonshire St.  
Room 3

*Boston, Jan 13<sup>th</sup> 1892*

*The E. Howard Watch & Clock Co.  
Boston*

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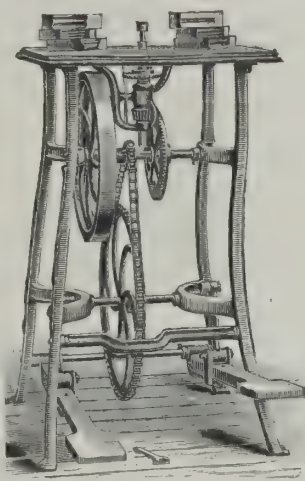
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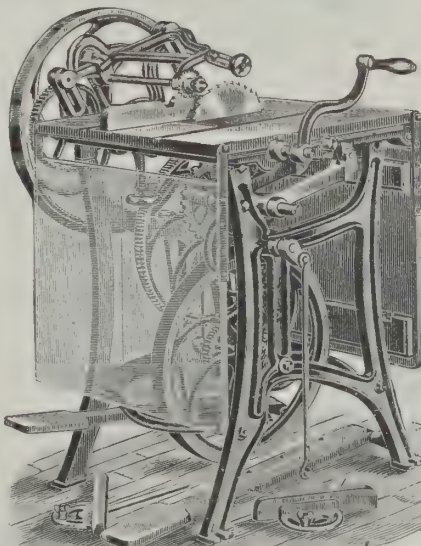
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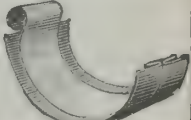
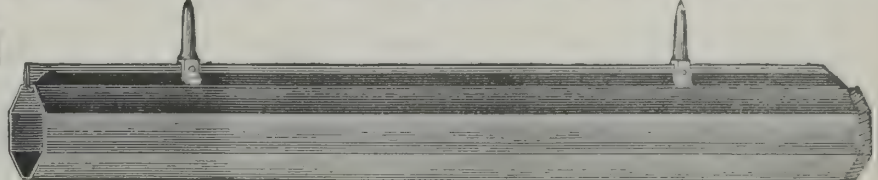
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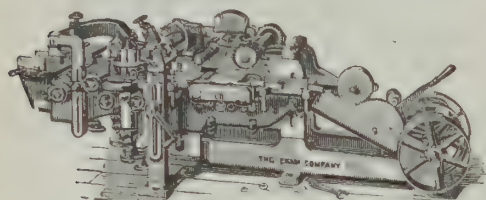
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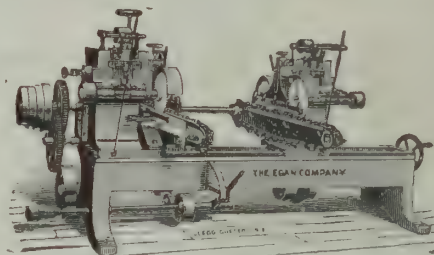
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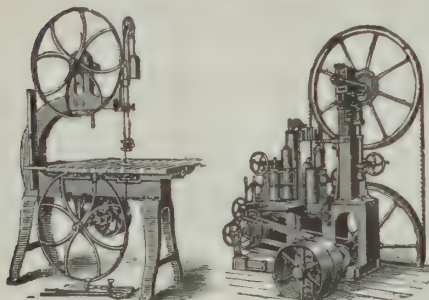
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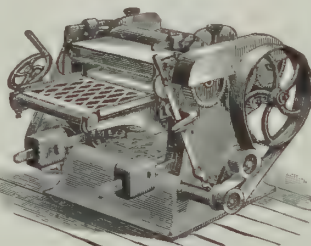
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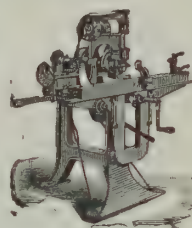
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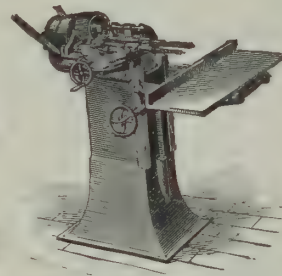
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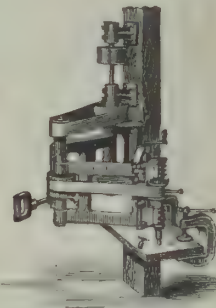
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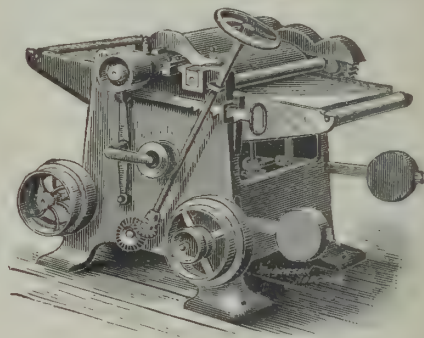
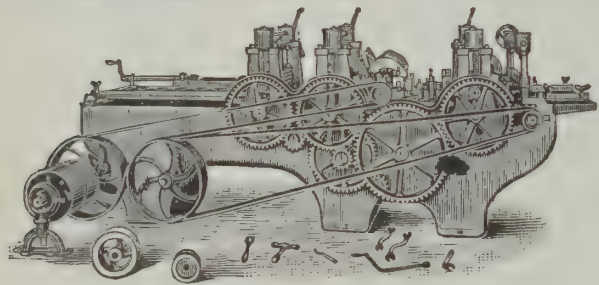
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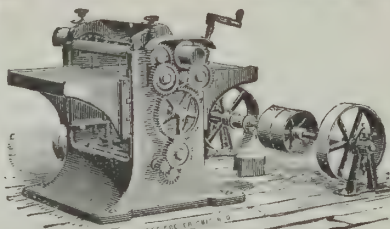
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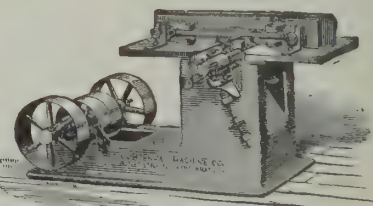
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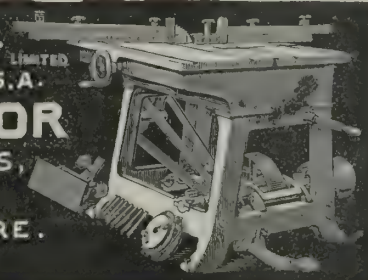
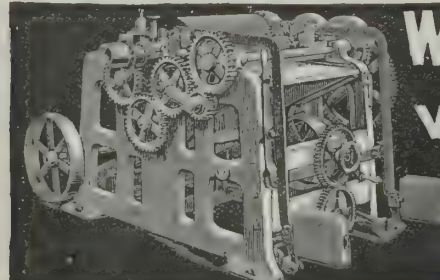
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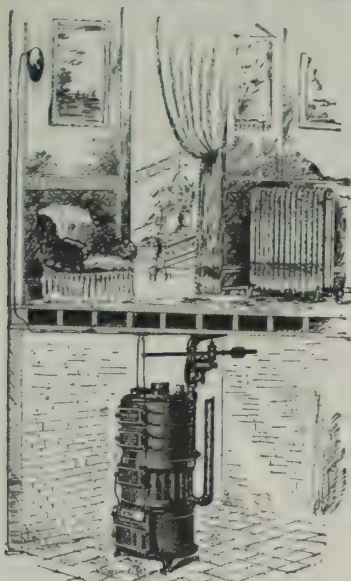
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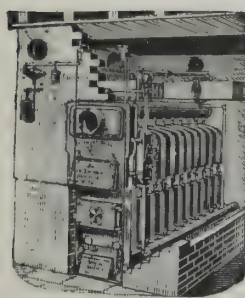
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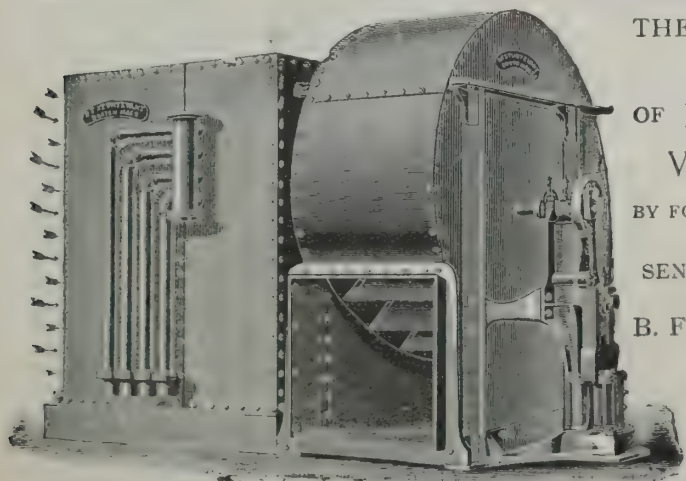


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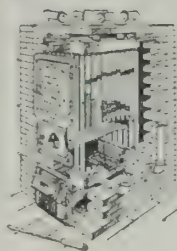
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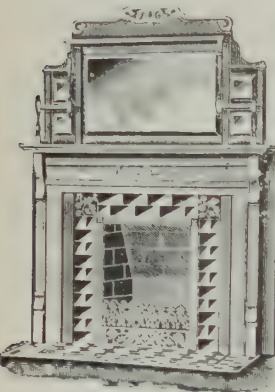


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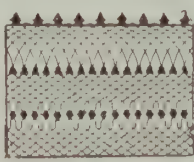
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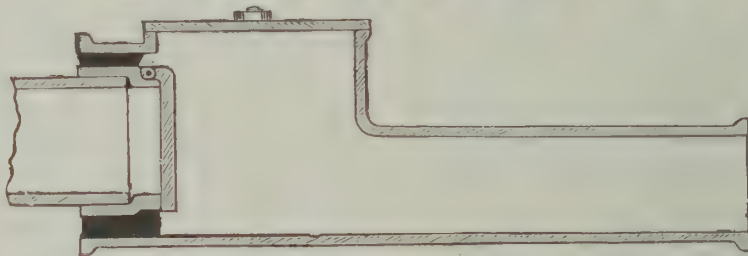
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(Continued from page viii)

(11) M. E. W. says: I have a range,  
with a hot water pipe for a bath room. The pipe in the  
range becomes stopped with scale of lime. What will  
remove it, or prevent it forming? A. There is no easy  
way to clear a range pipe of incrustation. A strong so-  
lution of caustic soda (3 or 4 pounds of caustic) put into  
the circulation will soften and break up the scale; but  
it will largely settle in the water back, and can only be  
cleaned out by taking out the water-back. The plumber  
should know what is best to do. Frequent use of the  
caustic soda will keep the pipes clear, but with the  
necessity of cleaning out the water-back each time.

(12) W. T. says: Can you inform me  
about what per cent of heat contained in anthracite  
coal, burned in a stove made for heating only, can be  
liberated into a room, or can you tell me whether there  
is necessarily a loss of 50 per cent or over, under the  
most favorable conditions? A. The loss of heat in  
common stoves may be as great as 50 per cent, but with  
the best stoves, provided with large absorbing and radi-  
ating surface, the loss should not be greater than 25  
per cent, and much of this might be saved by extend-  
ing the stovepipe, so as to utilize all the heat, save  
enough to create draught. Much of the heat is also  
lost by opening stove doors for ventilation.

(13) A. M. says: Assuming that the  
wood is steamed and bent when green, and allowed  
time for the wood to be thoroughly seasoned and set in  
the bend, would it be inclined to lose of the shape or  
curve if exposed to damp? If so, do you know of any  
process of rendering the wood damp-proof? A. Bent  
wood tends to resume its original shape when ex-  
posed to damp or becomes wet. The only way to pre-  
vent it is to finish and oil or varnish the bent wood, so  
as to prevent changes in its hygrometric condition.

(14) D. R. C. says: I wish to paint  
the brick walls of a composing room, used for setting  
type, and also the rough hemlock joists under the roof,  
with some white substance that will not scale off and  
fall into the type. Please state in the SCIENTIFIC  
AMERICAN what composition would be the best for this  
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A. We can recommend a whitewash made in the pro-  
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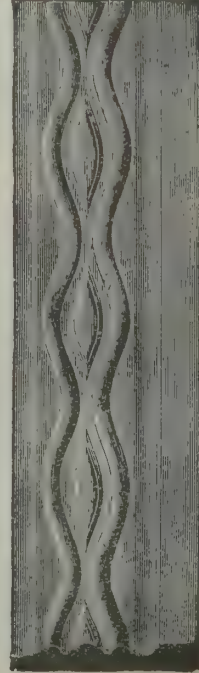
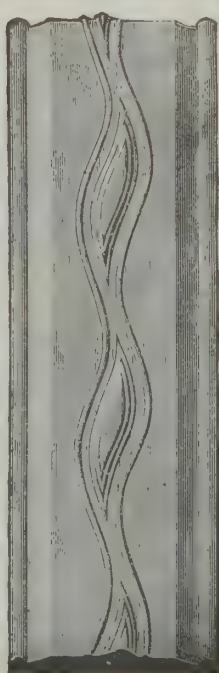
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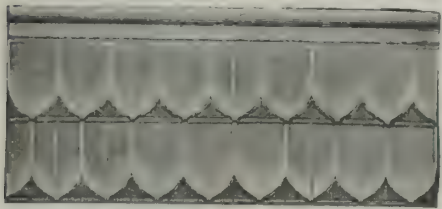
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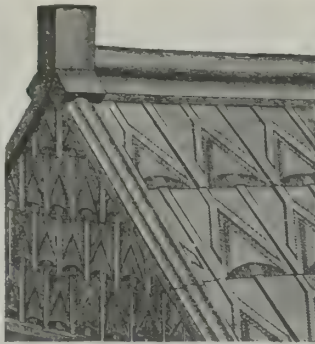
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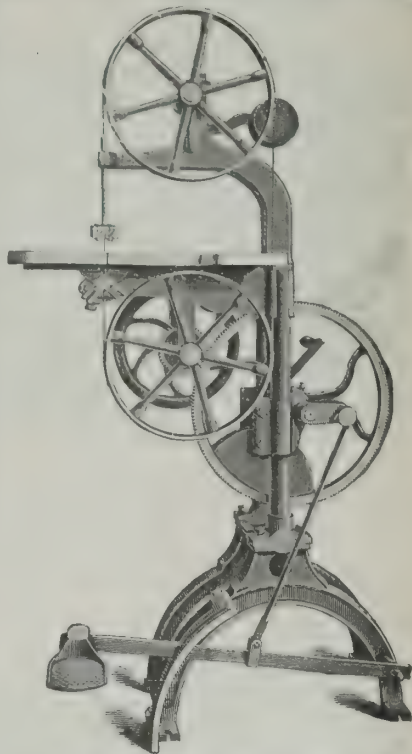


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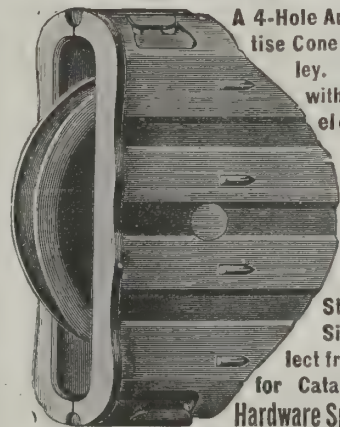
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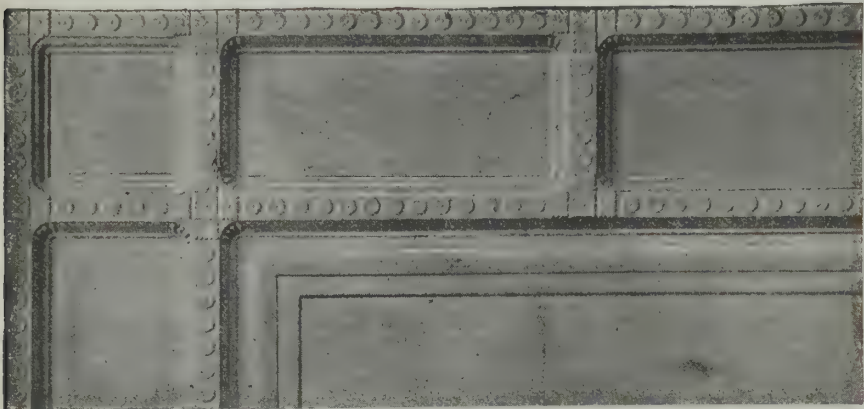
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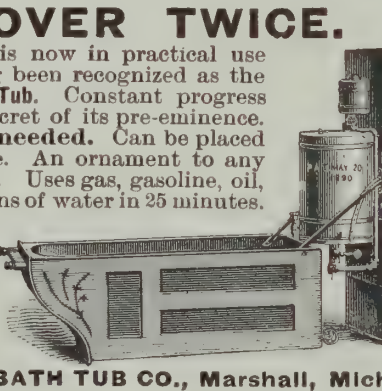
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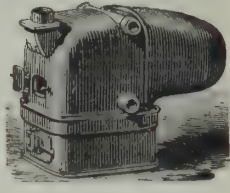
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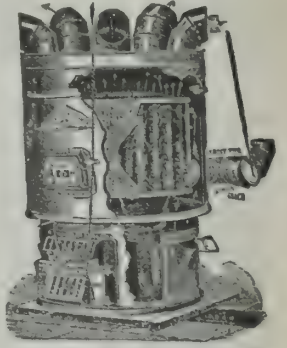




# PALACE KING AND PALACE QUEEN WARM AIR FURNACES.

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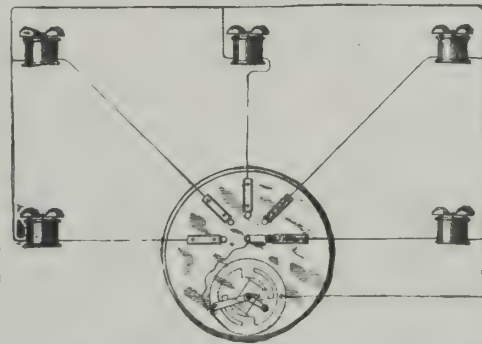
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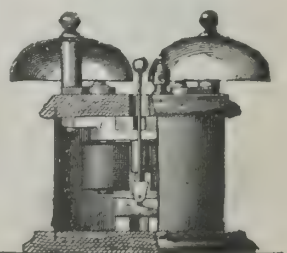
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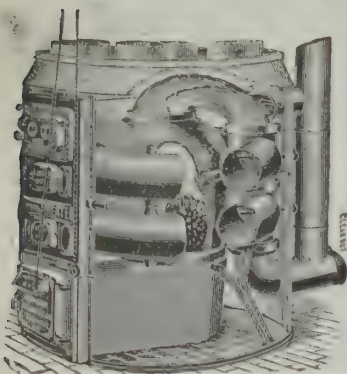




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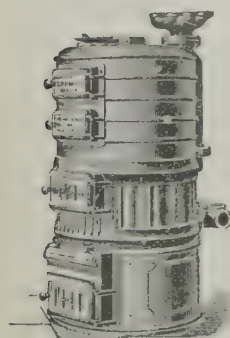


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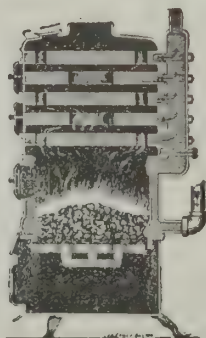
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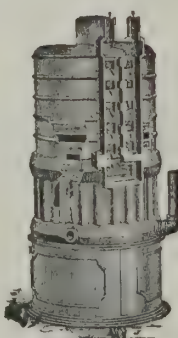
# "SPENCE" HOT WATER HEATER



Note attractive design.



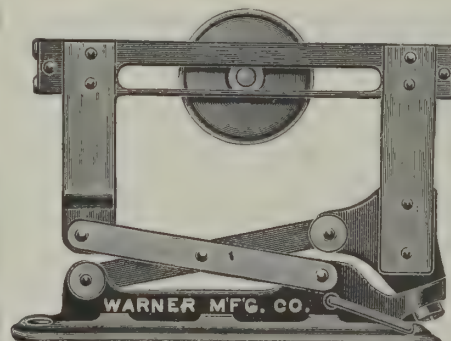
Note complete arrangement of flues.



Note course of independent circulation.

Each section an Independent Boiler. All parts made to gauge and interchangeable. Has the least number of Joints. Any part may be replaced without Disturbing the Piping. Burns Hard or Soft Coal, Wood, Coke, Gas, or Oil. Made in Seven sizes and used in Twin Coil section. These Heaters are not overrated. Send for catalogue and discounts to

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FOR EITHER  
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Anti-Friction Bearings, Adjustable, Noiseless, Hard Wood Track.  
NICKEL-PLATED.

This is the fourth invention of our Mr. Warner on Parlor Door Hangers. His long experience in this class of work enables him to produce a hanger superior in simplicity to any now on the market. We call attention to its automatic gravity lock, same as on our Double Track Hanger, which has won the universal approval of Builders. In hanging, after the base plate is screwed in place, the Door is coupled to the Hanger by simply sliding the parts together, when the gravity lock, of its own weight, falls and locks them in place. This of itself saves many hours of time over the setting of any other Hanger made. Having but a Single Track, the Carpenter has but one partition to set true, while with the Double Track he must have two equally true, thereby taking double the time. Then a Single Track Hanger adjusts itself to any unevenness in the track, thereby avoiding the complications of the "Adjustable" Double Track Hanger.

HAVE YOUR ARCHITECT SPECIFY IT IN YOUR PLANS.

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**The Warner Manufacturing Company,**  
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## AND BUILDERS

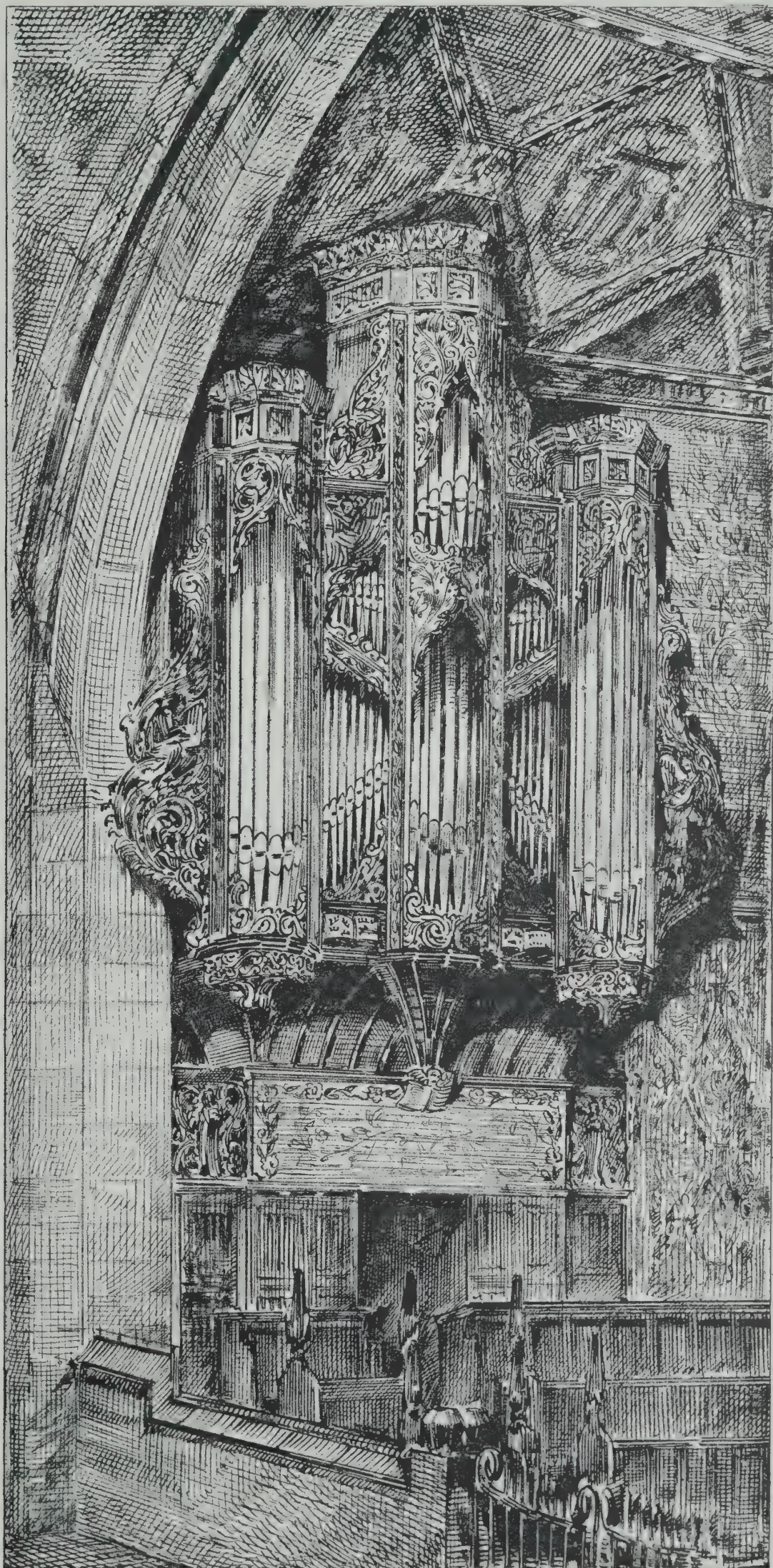
## ARCHITECTS

## EDITION.

Vol. XIII. Subscription, \$2.50 a Year.

NEW YORK, APRIL, 1892.

Single Copies, 25 Cents. No. 4.



DESIGN FOR ORGAN, ALL SAINTS', COMPTON, LEEK—BY MR. GERALD C. HORSLEY.

[See page 30.]





# Scientific American.

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O. D. MUNN.

A. E. BEACH.

NEW YORK, APRIL, 1892.

## THE Scientific American, ARCHITECTS AND BUILDERS EDITION.

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of SCIENTIFIC AMERICAN.

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### DESIGN FOR AN ORGAN.

A satisfactory finish for a church organ front is one of the most difficult of architectural problems. No object in the edifice is subject to so much exacting criticism. The organ usually stands in the very focus of observation, in the auditorium, and any ill-proportioned, inartistic parts of its design or finish become an eyesore to the congregation and a cause of discontent. On the other hand, if the organ is "a thing of beauty," it "is a joy forever." A very graceful, harmonious and artistic design for an organ is that presented in our engraving on page 49. It is the design of Mr. Gerald C. Horsley, and was exhibited at the Royal Academy Exhibition in 1891. We are indebted for our illustration to *The Builder*, London.

### A COTTAGE AT NEW ROCHELLE.

One of our colored plates this month illustrates a beautiful cottage, erected for the Manhattan Life Insurance Co., at Rochelle Park, New Rochelle, N. Y. The design is an admirable one; it is in the American style and combines a picturesque exterior and a convenient interior. The piazza, porches, balcony, bay windows and the curb roof are the features of the exterior. The underpinning is built of field stone, laid at random, the exterior above is shingled and weather finished, with all trimmings painted white. Roof shingled. Dimensions: Front, 35 ft.; side, 43 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. There is a cemented cellar under whole of house that contains furnace and necessary apartments. Hall, trimmed with cherry, contains a staircase of unique design, a paneled divan and bay window. This hall is lighted in a pleasing manner with stained glass windows. The floors are of hard wood. The other apartments are trimmed with whitewood, finished natural. Parlor and dining room have open fireplaces built of brick and furnished with tiled hearths and facings and hard wood mantels with beveled plate mirrors. Butler's pantry is of sufficient size to admit the usual fixtures. Kitchen and laundry are wainscoted and are finished in the best possible manner. Rear stairs lead from kitchen to second floor, and beneath these the stairs to cellar descend. The second floor contains three bed rooms with large closets, den and bath room, the latter wainscoted and fitted up with tub, bowl, and closet complete. Two bed rooms on third floor. Cost, \$5,200 complete. Mr. G. W. Thompson architect, same place. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

### A RESIDENCE AT BENSONHURST, LONG ISLAND.

In addition to the colored plate of this dwelling, which we give this month, we also present on page 55 an engraving and floor plan. It has been erected at Bensonhurst, Long Island, for William H. West, Esq., of the Primrose & West Minstrel Co. The design is not purely any one style, but is chosen from the various schools, and is an example of what might be called American. The first story, except the kitchen part, is built of brick laid in red mortar, with hollow walls to keep out dampness; the remainder being shingled and stained to give it an antique appearance. The high and rather steep roof with the round overhanging turret in the rear, overlooking the bay, the piazzas and bay windows, are the principal features. Dimensions: Front, 50 ft.; side, 44 ft., not including piazza. Height of ceilings: Cellar, 7 ft. 6 in.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The interior trim is colonial in feeling, and the door and window casings are carved in an elegant manner. The hall and dining room are trimmed with antique oak and each has a paneled wainscoting, five feet in height, and a ribbed ceiling. The staircase in hall is a very handsome one and it is furnished with massive carved newels and a silver candelabra. The hall also contains a fireplace built of Tiffany brick, with hearth laid with same, and it is provided with wrought iron dogs and trimmings. Dining room is fitted up with a fireplace, furnished with tiled hearths and facings, and a colonial mantel of excellent design and a bay window with seats and a spindle transom. Parlor and library are trimmed with cherry, the former containing a fireplace, with white onyx tiles and a mantel of exquisite design; the piano window is glazed with stained glass. Library is fitted up with book cases and window seats. Floors of hard wood. Butler's pantry is trimmed with oak and is replete with the usual fixtures. Kitchen, laundry, and pantries are trimmed and wainscoted with white pine finished natural. There are three bed rooms and bath room on second floor, besides three servants' bedrooms and bath. The bed room over parlor is handsomely finished in white and gold; the other apartments are trimmed with various kinds of hard woods. Bath rooms are furnished with tubs, bowls and closets complete. The plumbing is of the best description and is exposed. There is a large billiard room on third floor and four bed rooms. The cemented cellar under whole of house contains furnace, gas machine, and apartments. Mr. Stanley S. Covert architect, New York. Our engravings were made direct from

photographs of the building taken specially for the SCIENTIFIC AMERICAN.

### A COTTAGE ON THE MAINE COAST.

We publish, on page 54, a summer cottage, erected for Mr. G. W. Beale, on Great Diamond Island, near Portland, Me. Dimensions: Front, 43 ft.; side, 27 ft. 6 in., not including front piazza. Height of ceilings: First story, 9 ft.; second, 8 ft. The design is very picturesque, and the plan is excellent. The spacious piazza and balcony are the features of the exterior. The building is erected on brick piers with stone footings. The first story is clapboarded and painted light olive green, with bottle green trimmings, and the second story is shingled and stained sienna. Roof shingled and painted red. The interior throughout is trimmed with white pine, finished natural. All the partitions, furrings, and ceilings are ceiled with narrow beaded stuff. The floors are laid with yellow pine in narrow widths. The living room, spacious and well lighted, contains an open fireplace, built of brick, with hearth laid with same, and it is provided with a neat wood mantel. The staircase is separated from living room with posts extending to ceiling, and the space between filled in with spindle work. Dining room, kitchen, and its apartments are fitted up in the best possible manner. Second floor contains four bed rooms and large closets. There is ample room under house for storage. Cost \$1,470, complete. Mr. Antoine Dorticco architect, Portland, Me. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

### A RESIDENCE AT BRIDGEPORT.

We present on pages 56 and 57 a residence recently erected for Col. Mason, at Sea Side Park, Bridgeport, Conn. The residence as now completed is one of the most picturesque, best appointed and much admired of its class in its vicinity. The underpinning is built of local bluestone, rock faced and laid up in black mortar; the superstructure above is of wood, clapboarded and painted colonial yellow, with white trimmings. Roof shingled and finished natural. Dimensions: Front 51, side 74, not including porte-cochere. Height of ceilings: Cellar 8, first story 11, second 10, third 8'6". The main hall and staircase are the special features. The arch in hall is supported on colonial columns with carved capitals. This hall is trimmed with antique oak, and it has a paneled wainscoting, an open fireplace with a tiled hearth and mantel, a paneled divan, and a staircase with carved newels, which is lighted effectively with windows of beaded glass in delicate tints. Toilet is conveniently located under staircase. The parlor is trimmed in an elegant manner with carved casings and cornice, and is finished in ivory white. It contains a fireplace, furnished with tiled hearth and facings, and a mantel of exquisite design. The library is a spacious apartment, and it is trimmed with mahogany and provided with nook, bay window, and a large open fireplace, with a tiled hearth and facings, wrought iron trimmings and mantel. Den is fitted up similarly. Dining room is trimmed with antique oak and it has a paneled wainscoting, ribbed ceiling, and fireplace with colonial mantel. Butler's pantry is trimmed with similar oak, and is furnished with a bowl and shelf of Italian marble, and dressers fitted up complete. Rear hall and kitchen are trimmed and wainscoted with ash and are provided with all the necessary fixtures in the best possible manner. The second floor is trimmed with whitewood, treated in colors, and it contains five bed rooms and bath room complete. Bath room is wainscoted, and it is complete with exposed plumbing. Floors of hard wood. The third floor contains the servants' apartments, with private staircase. Cemented cellar contains laundry, furnace and apartments. Cost about \$25,000 complete. Francis H. Kimball architect, No. 40 Broadway, New York.

Our engravings were made from photographs of the building taken especially for the SCIENTIFIC AMERICAN.

### A RESIDENCE AT MONTCLAIR, N. J.

We present on pages 58 and 59 two perspective views and floor plans of a residence erected for William Wallace, Esq., at Montclair, N. J., from plans prepared by Munn & Co., architects, New York. The design combines a pleasing exterior and a well arranged interior. The underpinning is built with red sandstone, rock faced, and pointed in black mortar. The building above is sheathed with hemlock boards, well nailed to studs, and then covered with paper. The first story is clapboarded with beveled Michigan strips and the second and third stories are covered with cypress shingles—all painted lead color. Roof is also covered with cypress shingles. Dimensions: Front, 35 ft. 10 in.; side, 56 ft. 2 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft. 6 in.; second, 10 ft.; third, 8 ft. Vestibule and main hall are trimmed with quartered oak, and the latter contains a paneled divan and an ornamental staircase of similar wood, with massive carved newels. This staircase is lighted with stained glass effect. The floor is laid with oak and



highly polished. Parlor and library are trimmed with cherry, the latter containing an open fireplace, built of Trenton pressed brick, with a tiled hearth and a hard wood mantel of excellent design. Parlor has a similar mantel. Dining room is trimmed with dark ash, and it has a floor laid with Georgia pine, with a cherry border. Kitchen and its apartments are wainscoted and trimmed with Georgia pine, and the former is fitted up with wash tubs, sink, range, and pantries complete. The second floor is trimmed with white-wood, finished natural, and it contains four bed rooms, den, and bath room. Bath room is wainscoted and trimmed with cherry, and it has a floor laid with maple and cherry. There are three bed rooms and trunk room on third floor. Cemented cellar contains furnace and other apartments. Cost, \$8,500 complete.

Our engravings were made direct from photographs of the building taken specially for the SCIENTIFIC AMERICAN.

#### A MOUNTAIN SIDE RESIDENCE.

Our engravings, pages 51, 52, 53, illustrate a residence erected for W. A. C. Chace, Esq., at Montclair, N. J. The design is excellent. It combines both a pleasing exterior with a spacious piazza and a plan showing fine rooms, conveniently arranged. The underpinning is built of red sandstone, rock faced and laid up at random. The exterior framework is sheathed with good hemlock boards, laid on diagonally, covered with paper and then clapboarded, and painted olive gray, with bottle green trimmings. Roof shingled and stained an approved color with Cabot's creosote. Dimensions: Front, 67 ft. 9 in.; side, 32 ft. 10 in., not including front porch and rear piazza. Height of ceilings: Cellar, 7 ft. 6 in.; first story 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The vestibule and hall are trimmed with quartered oak, and the latter contains a staircase turned out of similar wood, and a fireplace built of brick and furnished with a tiled hearth, and a mantel of special design. The parlor, library, and dining room are trimmed with white-wood, finished natural. The doors and windows have heavy moulded casings. The fireplaces in library and dining room have tiled hearths and hard wood mantels. Rear hall, kitchen, and pantries are trimmed and wainscoted with Georgia pine, finished natural, with hard oil, and fitted up in the best possible manner. The second and third floors are trimmed with whitewood, and the former contains five bed rooms, large closets, and bath. Two bed rooms on third floor. Bath room is trimmed and wainscoted with ash, and it is fitted up replete with exposed plumbing. The floors throughout are double, and the vestibule and front hall have floors laid with oak. Cemented cellar contains laundry and other necessary apartments. Heated by a furnace. Cost, \$6,500 complete. Munn & Co. architects, New York.

Our engravings were made direct from photographs of the building taken specially for the SCIENTIFIC AMERICAN.

#### AN ASBURY PARK COTTAGE.

Our engraving, page 60, presents a dwelling of low cost, erected for Mr. W. L. Atkinson, at Asbury Park, N. J. Dimensions: Front, 30 ft. 6 in.; side, 42 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. Underpinning built of brick. The building above is framed with heavy timber, and constructed in a workmanlike manner. The exterior is sheathed from foundation to peak, and it is covered with white pine clapboarding, painted pearl gray, with light olive green trimmings. Blinds painted a dull red. Gables are shingled and painted red. Roof covered with octagonal cut slates. The interior throughout is trimmed with yellow pine, finished natural. The doors and windows have beaded casings and turned angle blocks. The floors are of similar wood laid in narrow widths. Hall contains an ornamental staircase. Parlor and library have hard wood mantels of neat design. Dining room is well lighted, and it is provided with a china closet. Kitchen is wainscoted and fitted

up with pantry and sink replete. The second floor contains four bed rooms, large closets and bath room, the latter wainscoted and furnished complete. One bed room and ample storage on third floor. The house is provided with gas, electric lighting, speaking tubes, and furnace. Cemented cellar under whole of house. Cost \$3,000 complete. Mr. Bodiene architect. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

#### The Speed of Elevators.

The maximum speed of the fastest passenger elevators which have ever been built, the New York *Journal of Commerce* says, is 1,500 feet a minute, a rate of one mile in three minutes and a fraction. Before the fire in the Western Union building in New York City occurred, that company had a machine which could run 1,500 feet a minute. It was the only one of its kind in the East. Mr. Thomas E. Brown, Jr., a consulting engineer of New York, thinks it possible there are few of equal speed in the West. These machines are of the water balance type—that of the original hydraulic elevator, the invention of Cyrus Baldwin. Owing to its expensiveness, and the fact that it could not be controlled automatically, it went out of use. The speed was regulated by the engineer, and it went fast or slow, as he pleased. With the modern elevator, almost any speed desired can be obtained; it all depends on the power used and the distance traveled. In a build-

are gaining favor in private houses. The common elevators of small business buildings are worth at least \$3,000. From that they range up to \$13,000 in the same class of buildings. The American elevators in the Eiffel Tower were costly affairs. They are somewhat similar to those now constructing at Weehawken, but have not the same lifting capacity. The journey to the highest platform, a distance of more than 900 feet, is done by three elevators. The longest run of any of them is 420 feet. Each can carry fifty persons. These elevators are remarkable because they do not go up in a straight line. Starting at an incline of 54°, they run for a distance of 250 feet, then around a vertical curve of 50 feet radius, and then at an incline averaging about 78°. From an elevator point of view, the new Masonic Temple building in Chicago will be the most important in the world. It will have twenty-four cars built in a circular shaft having a 250 foot rise. There will be express elevators, way and freight trains. The first will go to the top floor without stopping, while the others will stop either at every floor, or at the fifth, tenth, fifteenth, and so on. They will not run at full speed, probably because passengers do not like the sensation of flying. With the present safety devices it is just as safe to run fast as it is to run slow. Accidents are few, and invariably due to negligence on the part of the elevator attendants or the passengers. When accidents do happen, it is usually a case of the car catching persons as they step on or off. Passengers frequently try to board a car after it starts, with the result that, if caught by the elevator between the car and the floor or ceiling, they are killed in nine out of ten cases.

#### The Secret of a Good Memory.

Whatever may be said in regard to training the memory, it must be remembered that memory is not, as used to be supposed, an independent faculty of the mind that in some mysterious way may be directly strengthened by exercise, as a blacksmith strengthens his arm; but that memory is retentive is due to the plasticity of nerve substance, and to the property of nerve centers by which they retain in growth their functional modifications; and that recollection depends upon physiological conditions such as the cerebral circulation and the proper functioning of nerve cells; moreover, that a complete act of recollection is a complex process involving comparison, inference, and the like. Hence, whatever in general is conducive to vigorous health, and whatever tends to habits of clear and orderly thinking

—such conditions will aid recollection. And whatever is detrimental to the normal functioning of the nerve cells—fatigue, intense emotion or the like—and whatever blinds the judgment will hinder recollection. In short, all psychological beatitudes are on the head of him who has good health, sane emotions, and trained power of attention. But no amount of study, nor all the prescriptions of mnemonic doctors, from Simonides to Loiset (except so far as they train attention), can atone for anæmia of body or lack of the power of attention.—Prof. W. H. Burnham, in *Scribner's*.

## PATENTS.

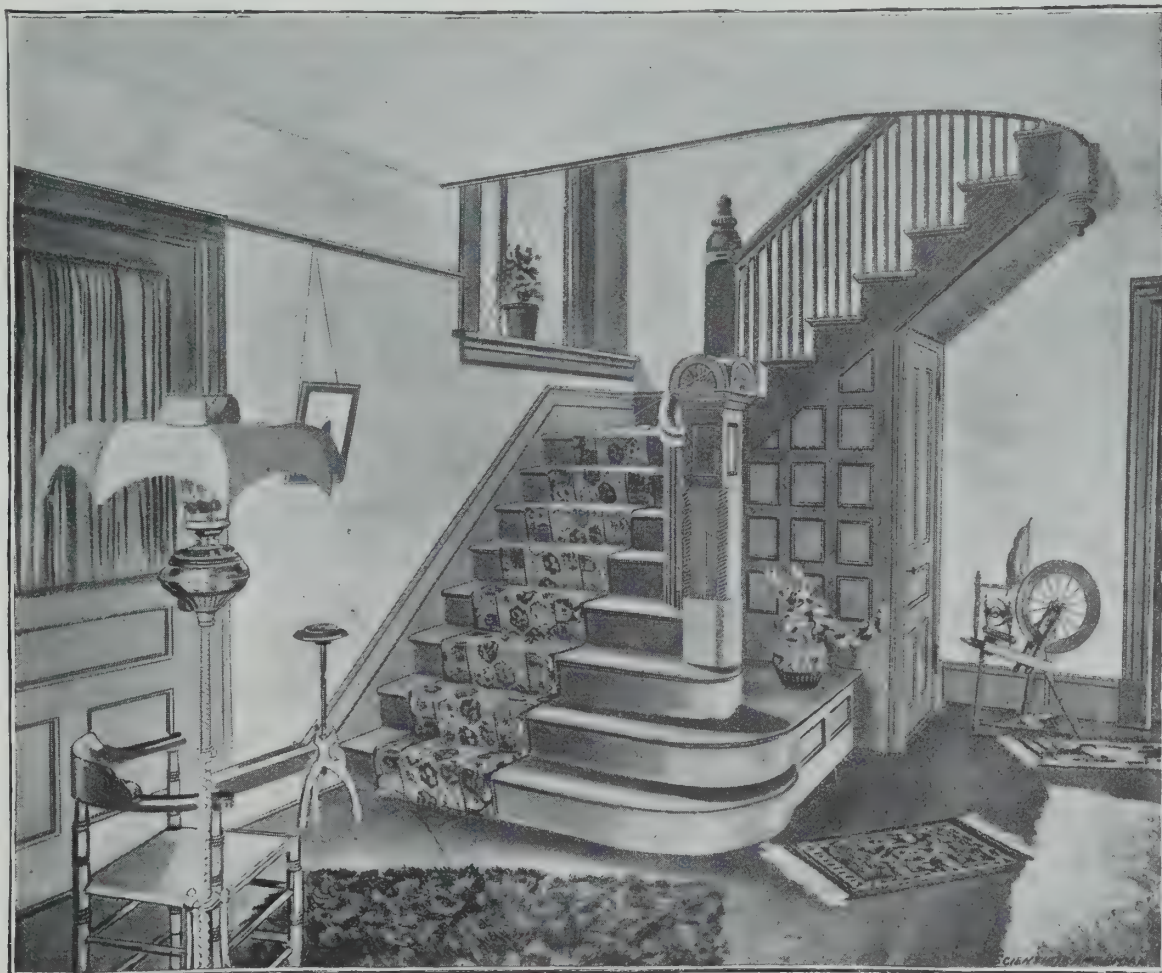
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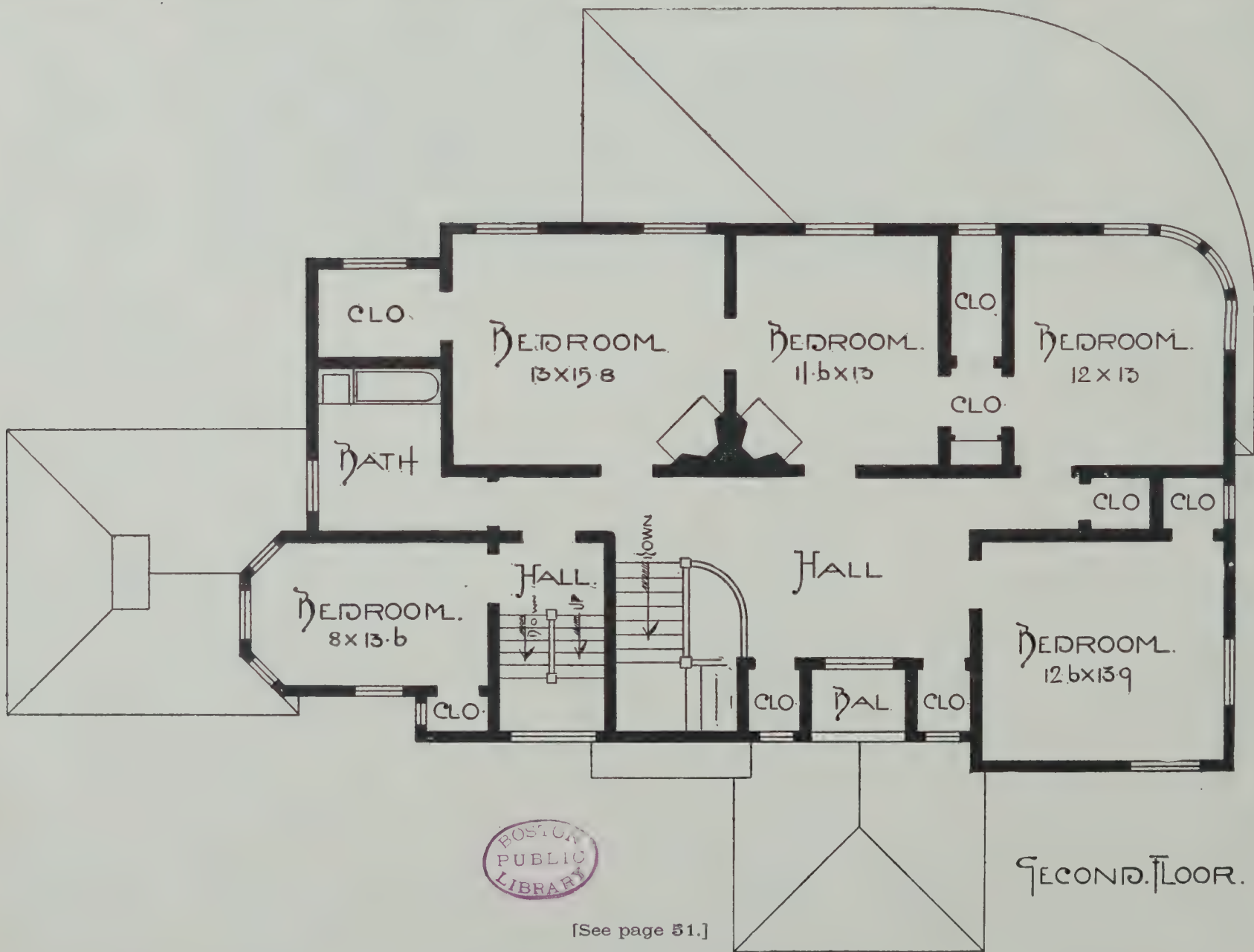
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A MOUNTAIN SIDE RESIDENCE—INTERIOR.

ing which has a shaft of 250 feet, a speed of from 850 to 1,000 feet a minute can be attained. On a rise of 150 feet it is easy to get a speed of 750 feet per minute with a weight of 1,000 pounds aboard the elevator. In New York the fastest elevators are in the Union Trust Company's building on Broadway, near Wall Street. They shoot up or down, carrying 3,000 pounds, at a speed of 600 feet a minute. When tested with lighter weights, they have traveled from 800 to 900 feet in a minute. But the average speed of elevators in office buildings in and around New York is 300 feet a minute. It is best adapted for work, and experience has demonstrated that more passengers can be carried daily in a car going at that speed in the ordinary large building than any other. The increase in the size of elevators is in keeping with improvement in other directions. The largest passenger cars in the world are now in course of construction at Weehawken. These elevators, of which there are three, are designed to carry 135 persons on each trip, and are equivalent to ten tons. They will be owned by the North Hudson County Railway Company. A viaduct 875 feet in length has been built out from the Palisades to a point above the ferry depot. From the rails on the viaduct to the river level the distance is 150 feet. An elevator shaft of that extent is now building, and passengers who cross the ferry will be transferred to the elevators and thence to the trains, instead of ascending to the Palisades by the inclined railway, as heretofore. The railroad company's contract calls for a speed of 200 feet a minute, but, as a matter of fact, the cars will be capable of going much faster. Each elevator will be worked by 200 horse power. The entire plant will cost \$39,000. Elevators





A MOUNTAIN SIDE RESIDENCE.









A COTTAGE AT NEW ROCHELLE.



FIRST FLOOR.



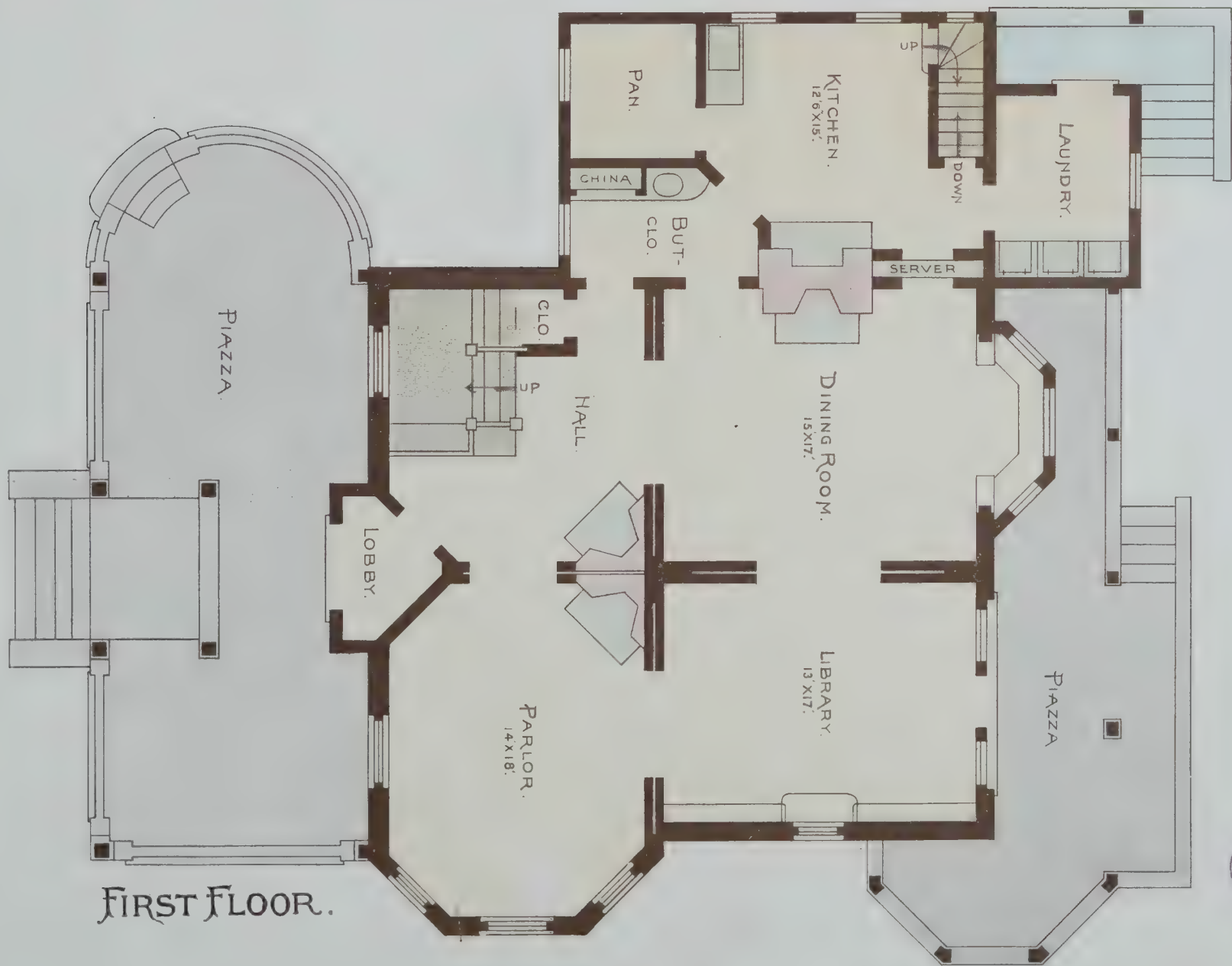
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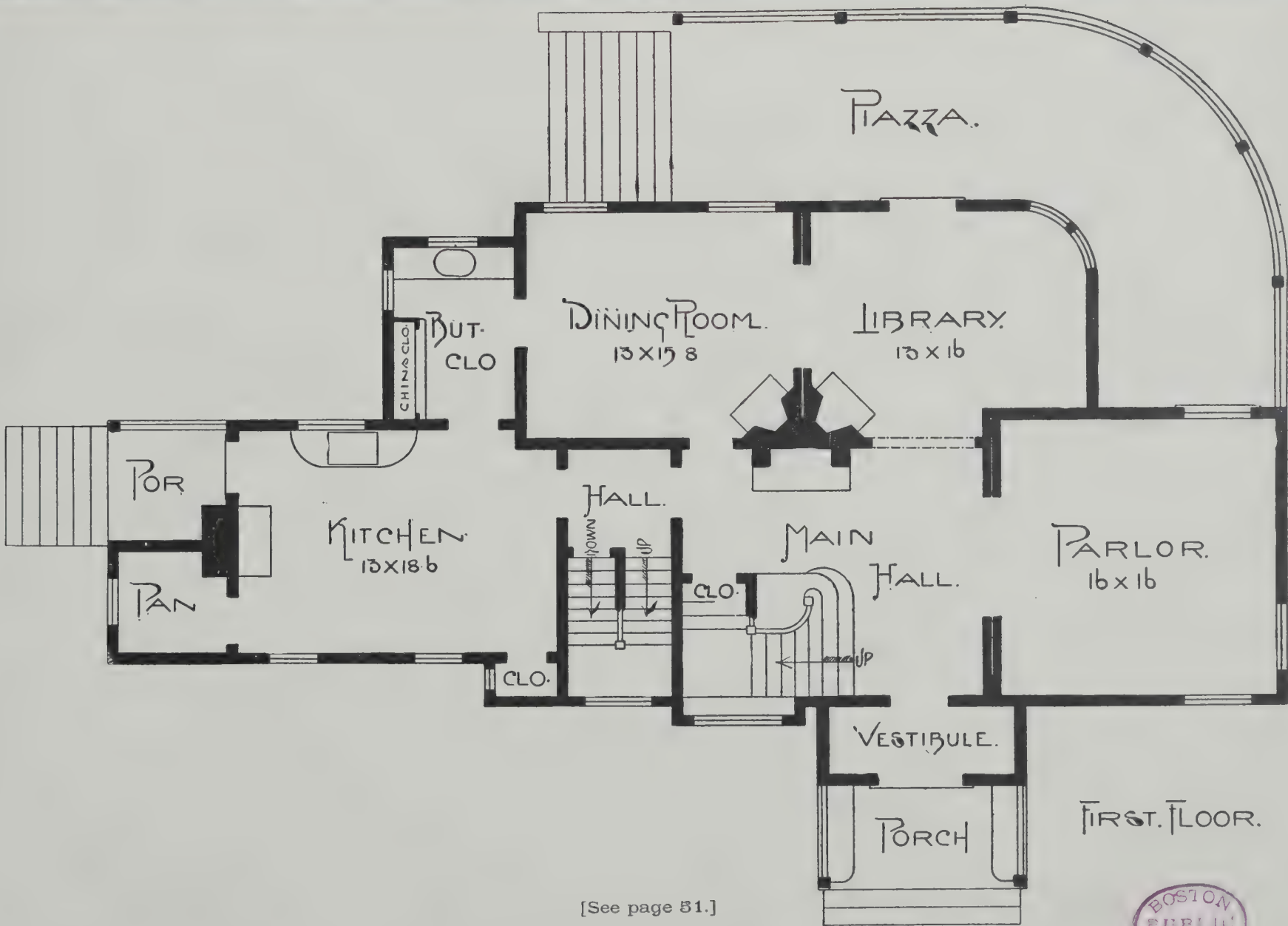
A RESIDENCE AT BENSONHURST.





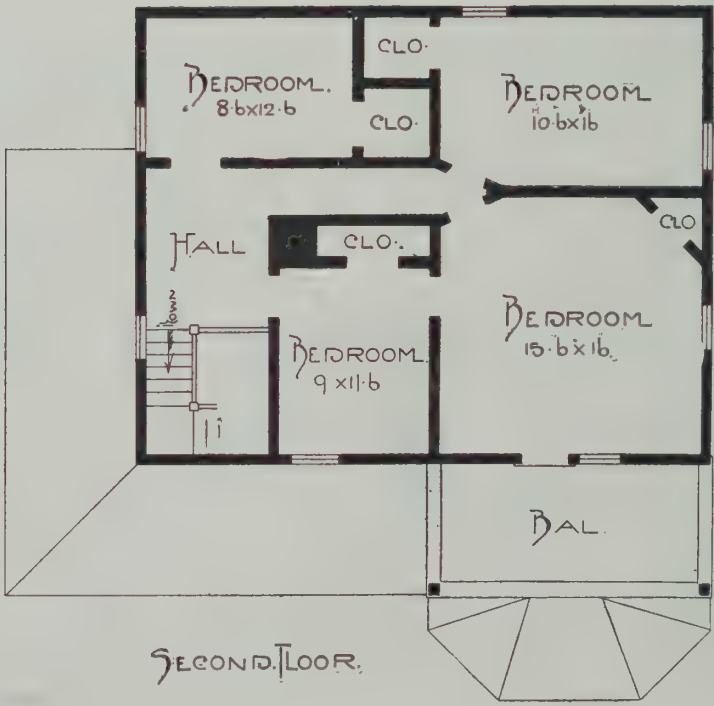
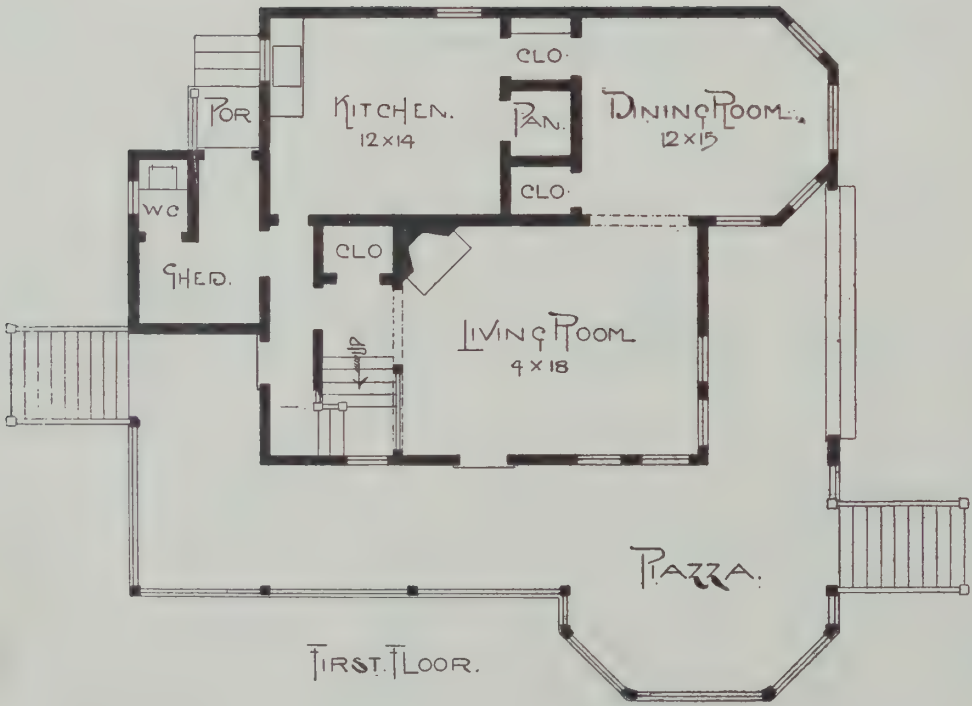






[See page 51.]  
A MOUNTAIN SIDE RESIDENCE.

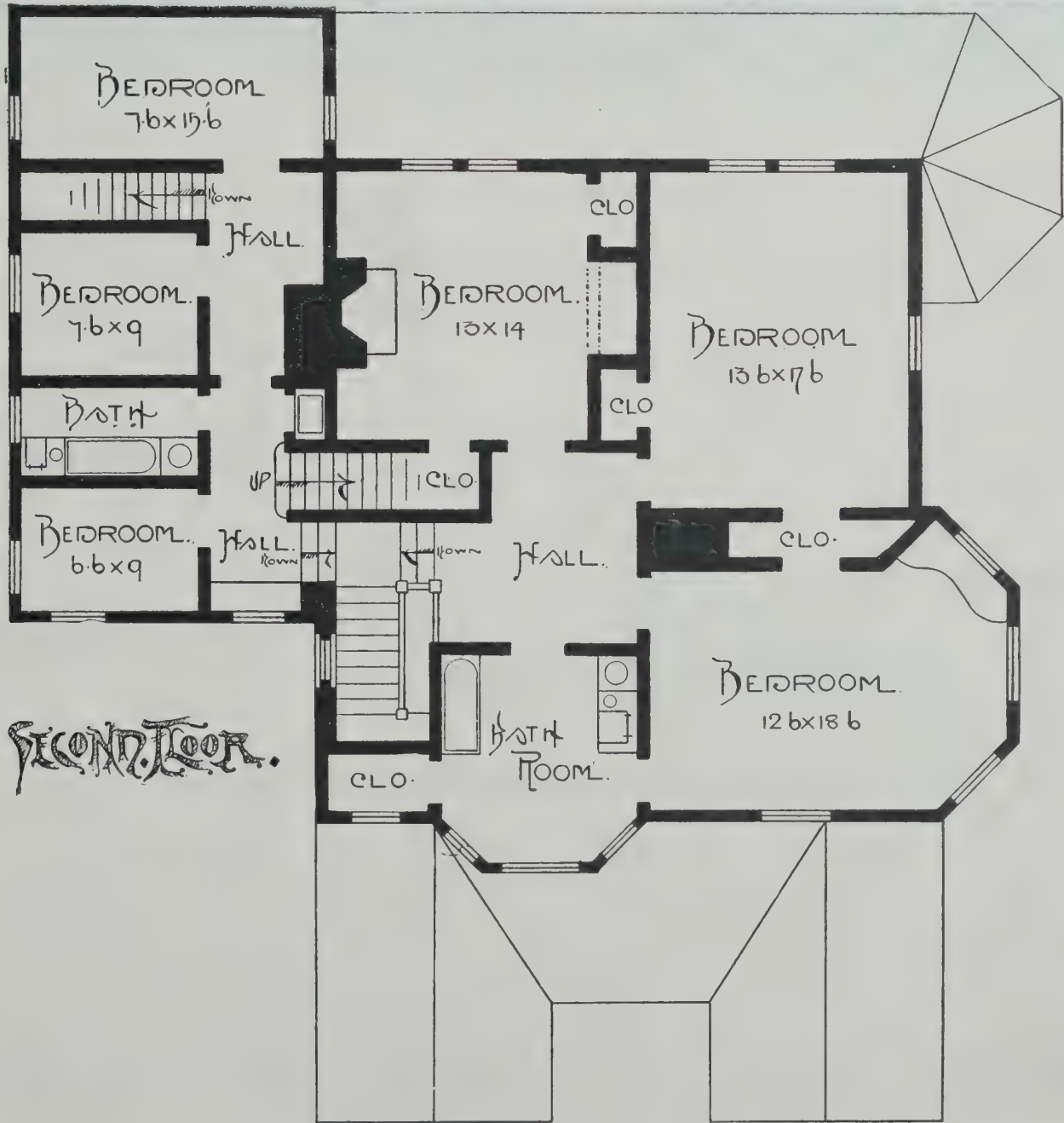




[See page 50.]

A COTTAGE ON THE MAINE COAST.

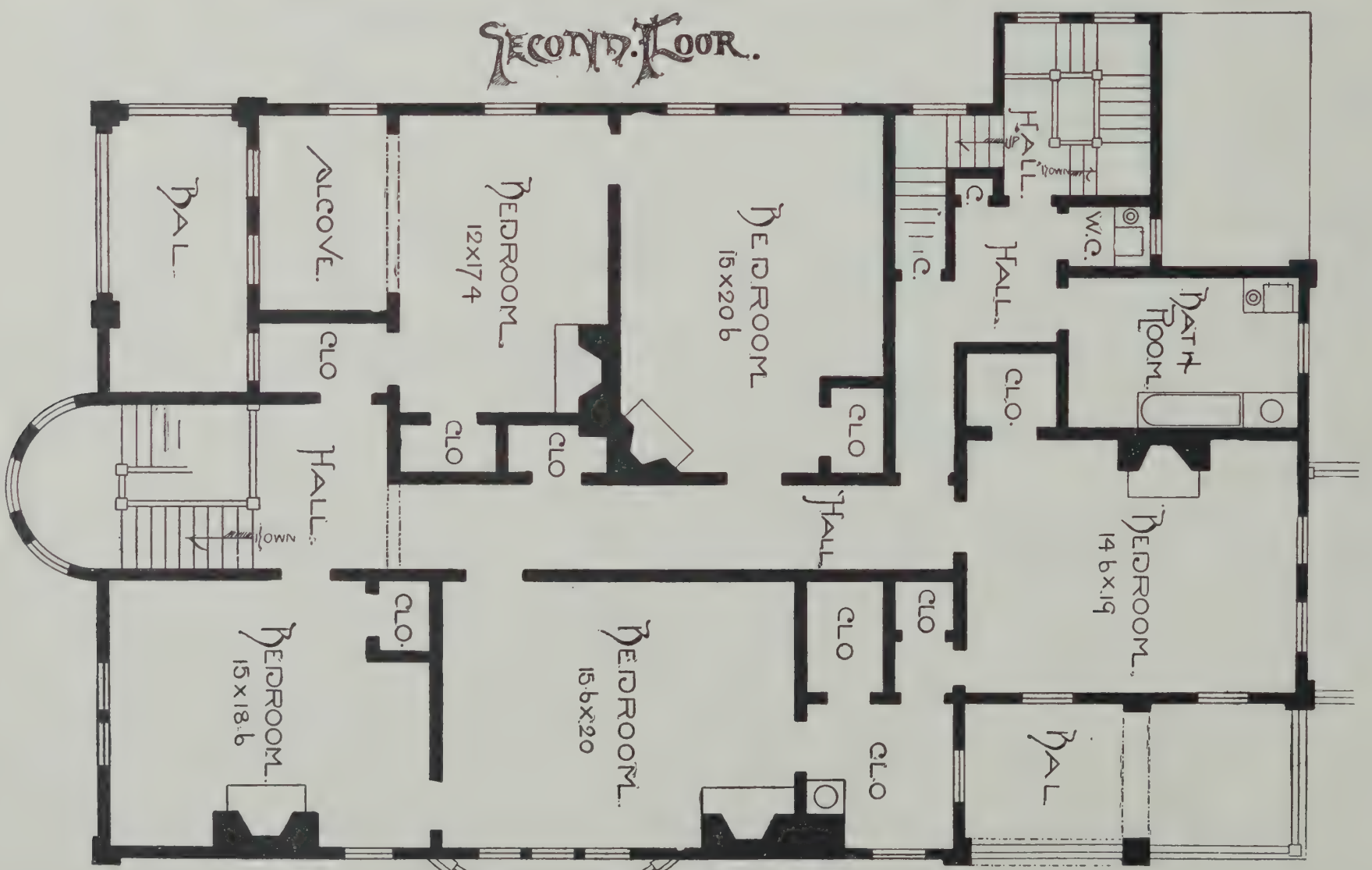




A RESIDENCE AT BENSONHURST. [See page 50.]



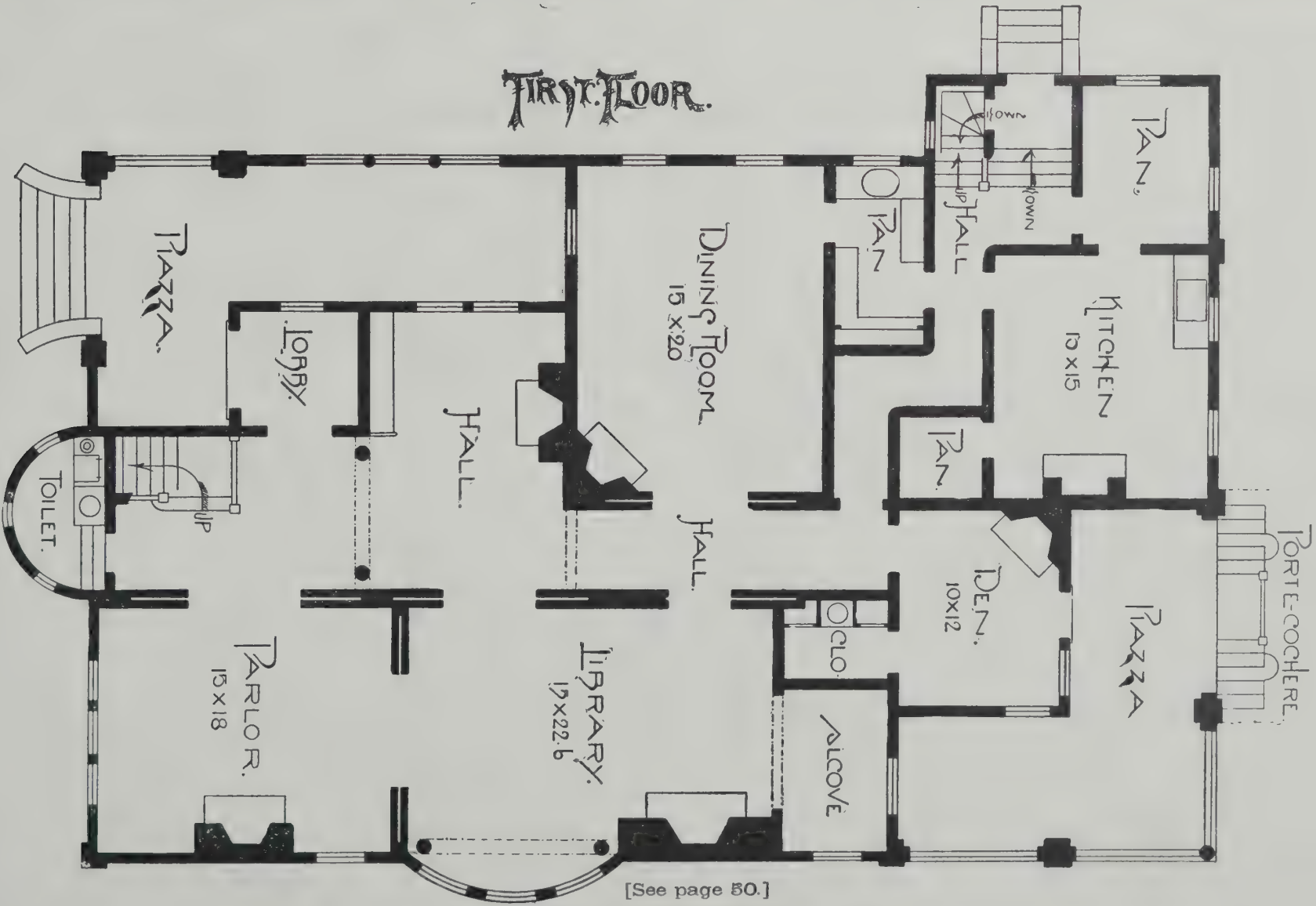




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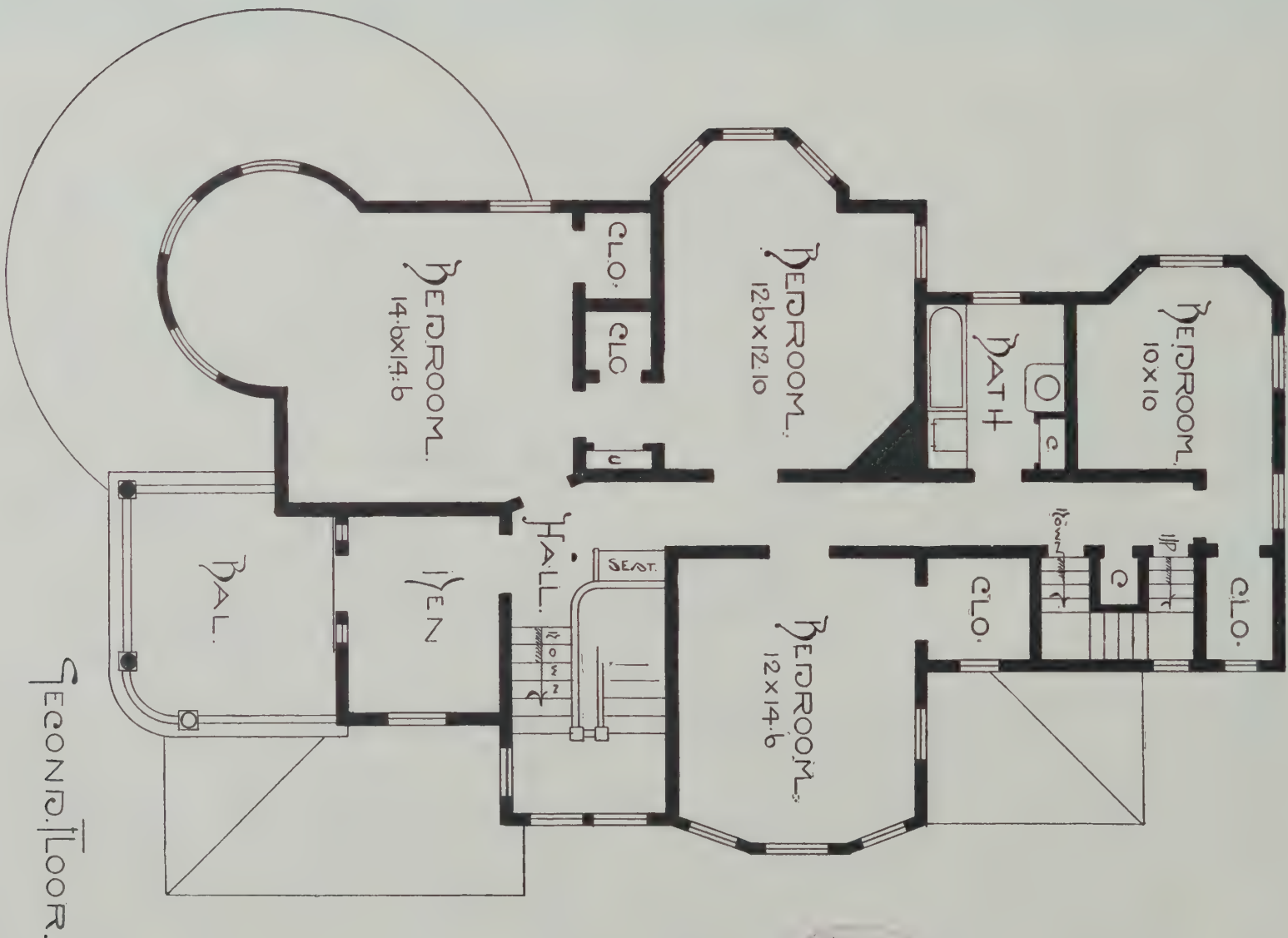
A RESIDENCE AT BRIDGEPORT, CONN.





A RESIDENCE AT BRIDGEPORT, CONN.

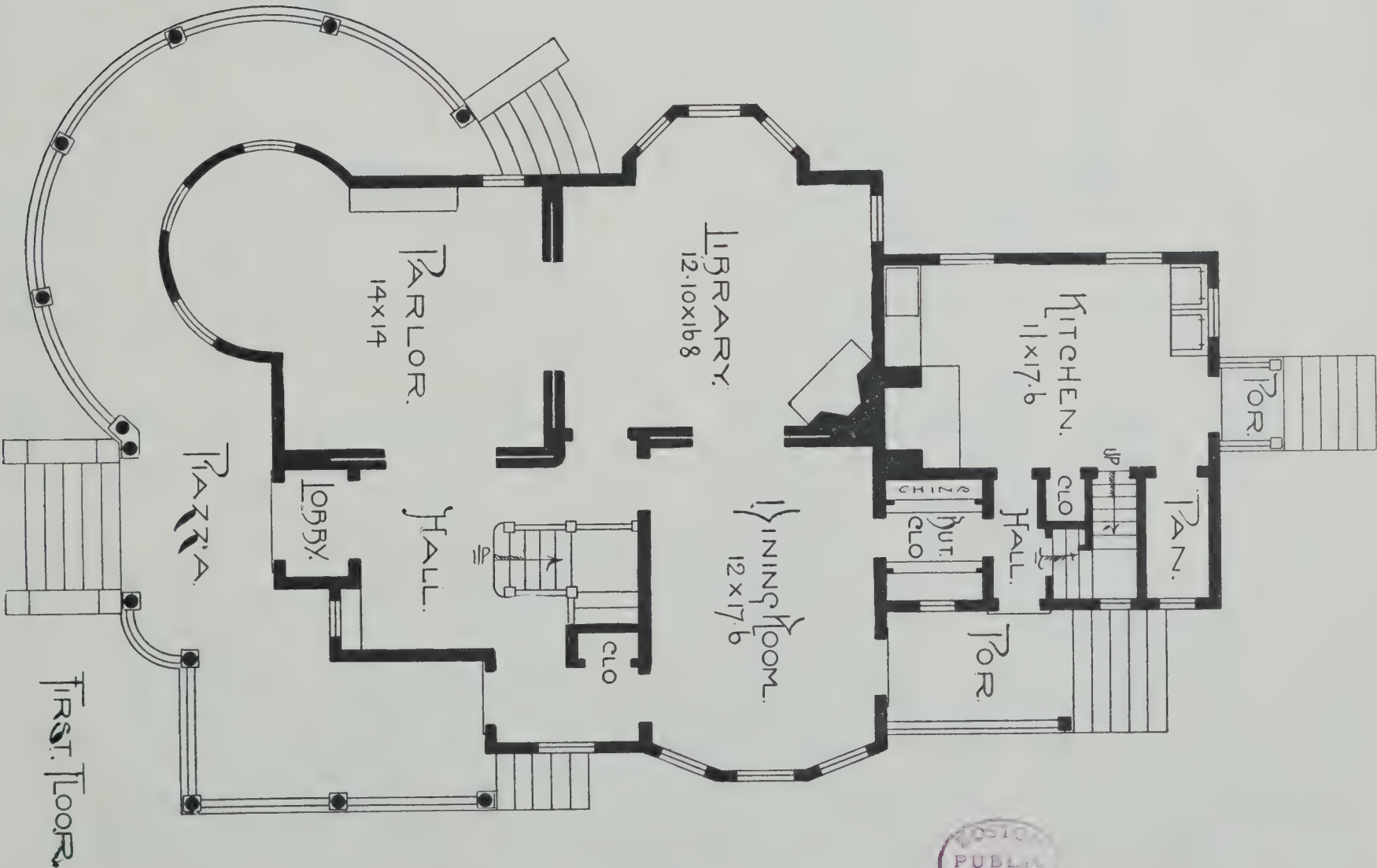




[See page 50.]

A RESIDENCE AT MONTCLAIR.

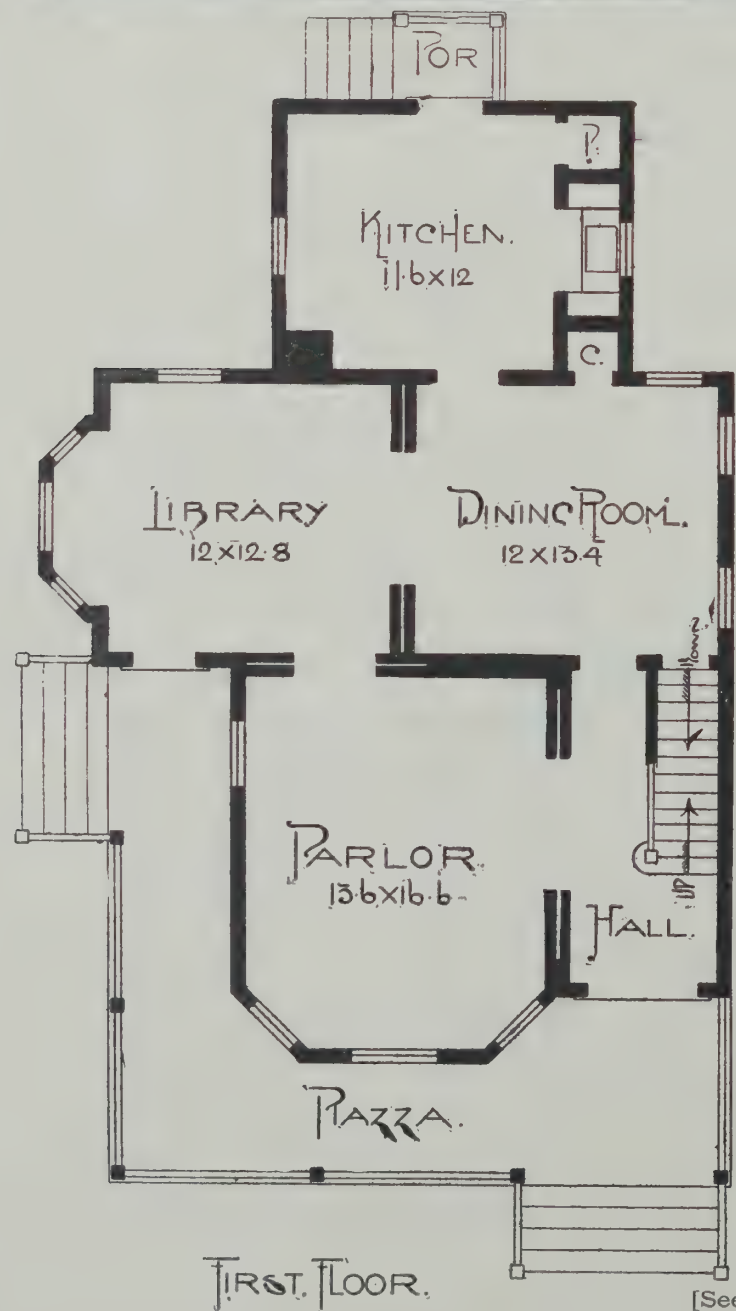




[See page 50.]  
A RESIDENCE AT MONTCLAIR.



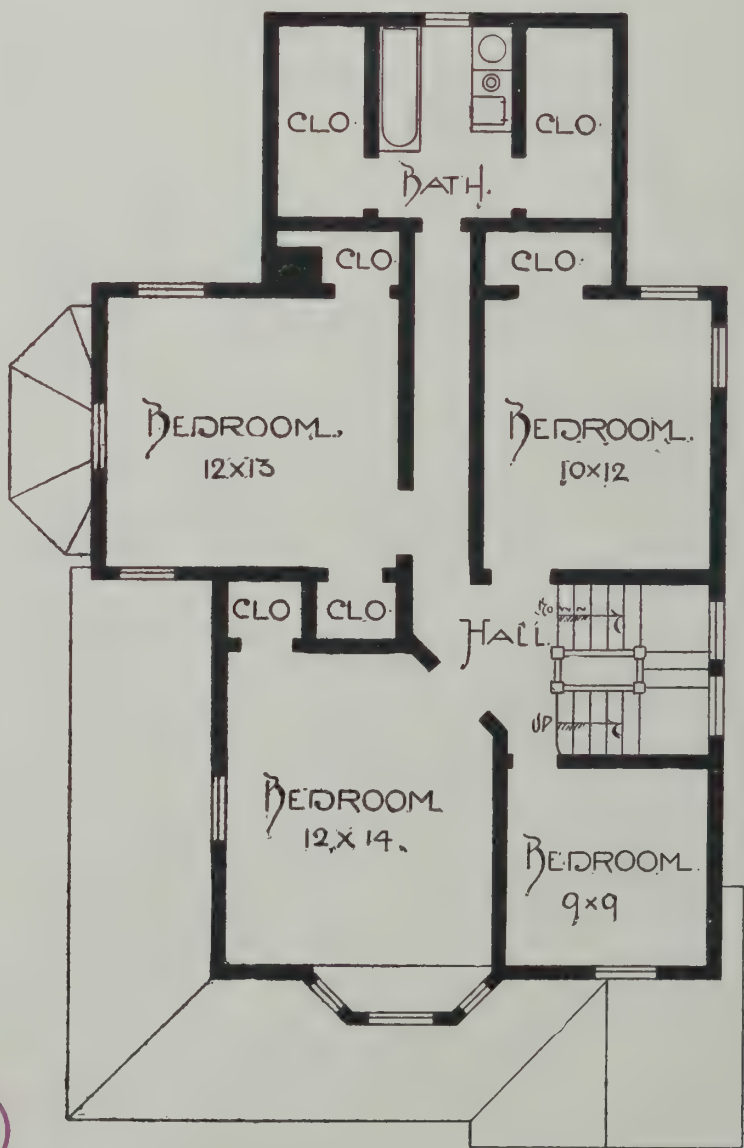




FIRST FLOOR.

[See page 81.]

AN ASBURY PARK COTTAGE.



SECOND FLOOR.





A CEMETERY CHAPEL OF MODERATE COST.

We find in the *Illustrated Carpenter and Builder*, of London, the accompanying sketch, in which the author has endeavored to design something picturesque and suited to the nature of the surroundings, but at the same time capable of being constructed of the simplest materials, so as to keep down the cost. No dressed stonework would be required, it being suggested that the walls should be built of local rubble with large squared stones at angles, windows, etc. The window frames could be either wood or iron. Should no bell be required, the turret on ridge might be omitted.

RICHMOND HILL CONGREGATIONAL CHURCH AND PARSONAGE, BOURNEMOUTH.

The site might almost be described as approaching the architectural ideal for its purpose, possessing the rare advantages of being central without being too public, and occupying a raised position, which is, at the same time, easily accessible, and it combines many advantages attaching to the question of position in a marked degree. The main objects to be attained by the plan were first the accommodation of a large congregation in a compact form, the necessary connection with the existing school and class rooms to the north of the building, and the provision for further school buildings and lecture hall accommodation adjoining. As will be seen by the plans, these essentials are met by the main corridor at the rear communicating at once with the old class rooms and leading to those it is proposed to add at the northeast of the block, this corridor being also in connection with the staircases leading to the lecture halls above and the children's galleries in the transepts, as well as to the lobbies from the vestries to the church on the ground floor. The church proper in this case naturally assumes a some-

what cruciform plan, without any endeavors on the part of the architects toward ecclesiastical precedents; on the other hand, as their principal efforts have been directed to the comfort of the congregation, they have avoided as much as possible any arrangement by which columns would intercept the view of the congre-

mediately adjoins, the organist and his choir are in perfect touch with each other. The tower is placed at the southwest angle, forming on the ground floor the principal porch and entrance to the building. In the nave and transepts on the ground floor the building is arranged to accommodate about 900 people, this number being increased to about 1,100 by the sittings provided in end and transept galleries. The building is designed throughout in the spirit of a somewhat late period of Gothic, the materials being principally Swanage stone walling, with Bath or Portland stone dressings, and most of the old materials that are sound will be incorporated in the new structure. It is proposed to warm the whole building on the hot water circulating system, supplemented by one of warm air to be used when necessary. Fireplaces are, however, provided in most of the class rooms in addition. The ventilation is effected by two extract shafts on each side of the roof, communicating in the one case with the fleche, and the other with the tower, both being provided with a gas cone to promote a proper current and prevent down draught. The estimated cost is between \$50,000 and \$55,000, the plans of the architects, Messrs. Lawson & Donkin, of Bournemouth, having been selected in a local competition.—*The Building News*.



A CEMETERY CHAPEL OF MODERATE COST.

gation, and have therefore made the aisles assume the functions of simple gangways, except at a time of emergency, when the space might be made available for extra chair accommodation. The floor is raised toward the south, and the seats arranged in circular form, so that all occupants may more conveniently face the pulpit. The apse is entirely appropriated to the use of the choir, and as the organ chamber im-

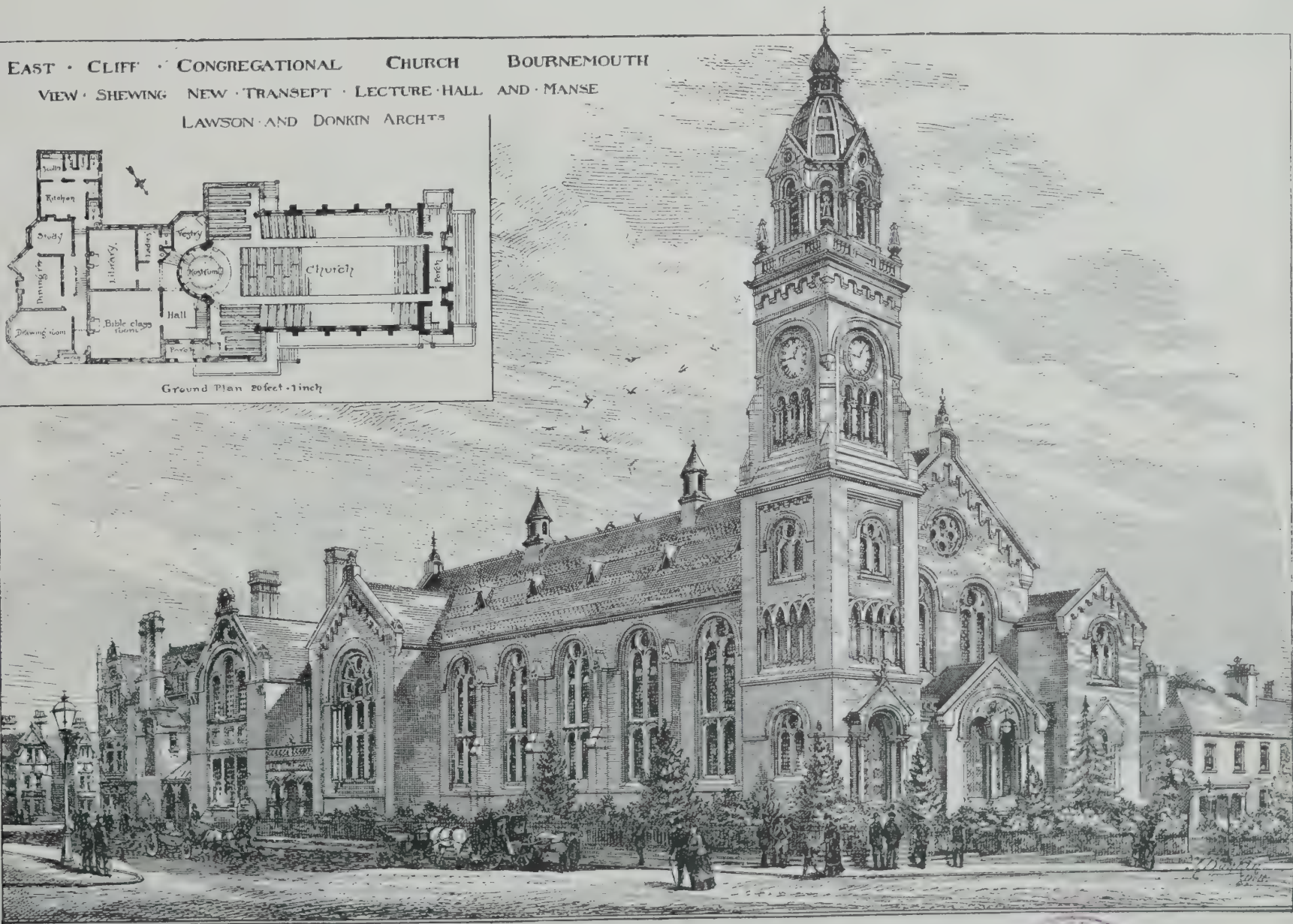
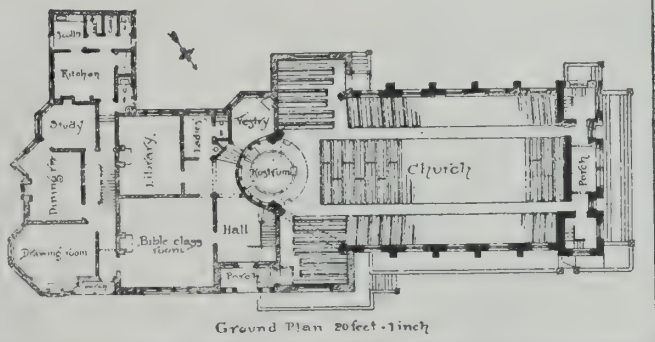
tented a plastering composition, of which the following is a specification:

"I take about 90 pounds of cotton seed oil, and after heating it to about 120° Fahrenheit I add thereto about 45 pounds of caustic soda lye of 36° Baume. I stir this mixture and allow it to stand undisturbed for one or two hours or more. I then heat the mixture again to boiling point, adding, by degrees, about 30

Plastering Composition.

Arthur L. Grant, of Toronto, Canada, has lately patented a plastering composition, of which the following is a specification:

EAST · CLIFF · CONGREGATIONAL CHURCH BOURNEMOUTH  
VIEW · SHEWING NEW · TRANSEPT · LECTURE · HALL AND · MANSE  
LAWSON · AND · DONKIN ARCHTS



RICHMOND HILL CONGREGATIONAL CHURCH AND PARSONAGE,





pounds of water, and continue the boiling for two or three hours. I finally add sufficient salt to separate the crude sodium oleate from the water, and run the water off, by means of a tap or otherwise, from the supernatant sodium oleate. This oleate I dissolve under heat in the proportion of about 4 pounds of oleate to about 4 pounds of water, and to this solution I add about 12 pounds of water and 75 pounds of a dry pulverized absorbent—for instance, clay or talc. This mixture is dried and pulverized and forms the preliminary compound. It is desirable that the absorbent should contain no free acids or any soluble salt of lime. This dry compound is now ready for use. When this compound is mixed with plastering materials for walls, ceilings, etc., containing lime in any form—for instance, sulphate of lime, carbonate of lime, or hydrated lime—it renders such plastering material non-absorbent and impervious to water and gases, and such walls and ceilings can be papered, painted, or otherwise treated without the usual sizing or preparation. It also reduces the suction of the material laid upon the wall or ceiling and permits the

In using this compound in plastering material which contains plaster of Paris or lime, I use about 80 pounds of the dry compound to 300 pounds of plaster of Paris, or from 50 to 100 pounds of lime. For lime water or cements I use from 10 to 40 pounds of the dry compound to 100 pounds of lime or cement in the mixture.

of the above two ways, they may be dissolved in water and applied to the lime mortars, cements, or concretes in the proper proportion when required for use."

#### DESIGN FOR A FAMILY BURIAL VAULT.

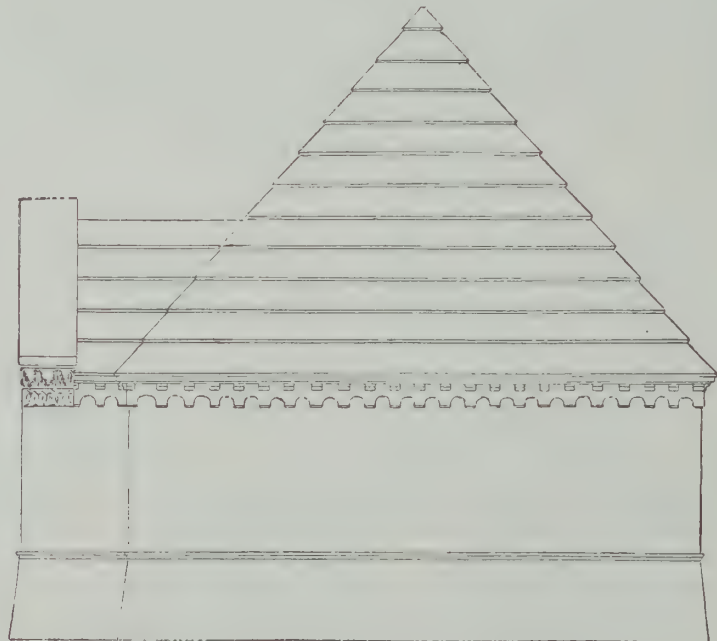
We present a design for a family burial vault, for which we are indebted to *Stone*.

It is the second prize design in the competition No. 3 of *Stone*, Cincinnati Architectural Club. It is an appropriate design, well suited for the intended purpose.

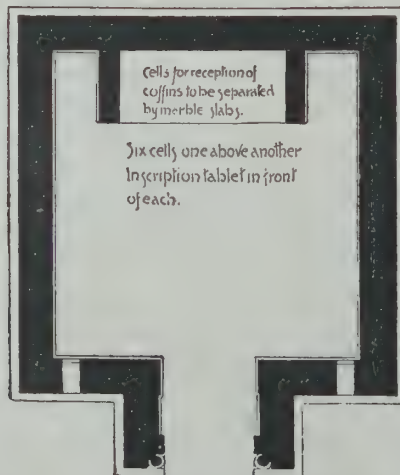
THE desire for fitness and beauty in architecture is, perhaps, much more common among even the rudest of the population than is generally imagined; and the pleasure which a beautiful and proportionate building may give to millions of people, even though they see it but for a few moments as they hurry to and fro, is a pleasure not to be despised; and, moreover, it is a great, though silent, means of education. The greatest critics (such, for instance, as Lessing) have laid down the rule that, if possible, nothing in art that is disproportionate or misformed or badly colored should be brought before



Front Elevation



Side Elevation



Plan

Design for Family Vault  
(in Archt. Club competition)  
Submitted by REST

Scale for Elevations  
 $\frac{3}{8}'' = 1'$

Scale for Plan  
 $\frac{1}{4}'' = 1'$

#### DESIGN FOR A FAMILY CEMETERY VAULT.

next coat or layer to be placed on the same with greater ease. This plastering composition can be used both for outside and inside plastering or upon damp walls, and forms, practically, a water-proof surface. The admixture of this compound to lime mortar, cement, and concretes composed wholly or in part of carbonate or sulphate of lime or hydrated lime renders the mixture capable of resisting the action of water.

"Instead of preparing a preliminary dry compound containing the oleate, as above described, the oleate can be dried by itself in a water bath or otherwise at a temperature below 225° Fahrenheit, and then be pulverized or comminuted. This dry comminuted oleate can be added directly to the plaster, mortar, cement or concrete when required for use.

"Instead of using the oleates or palmitates in either

the eyes of the young. They even object to caricature on this ground. To adopt such a proposition in all its bearings may be unpractical, may be almost impossible. But certainly the converse holds good, namely, that to bring before the eyes of the young and the uneducated beautiful and well-proportioned objects of art is a means of education, the indirect effects of which it is difficult to overestimate.



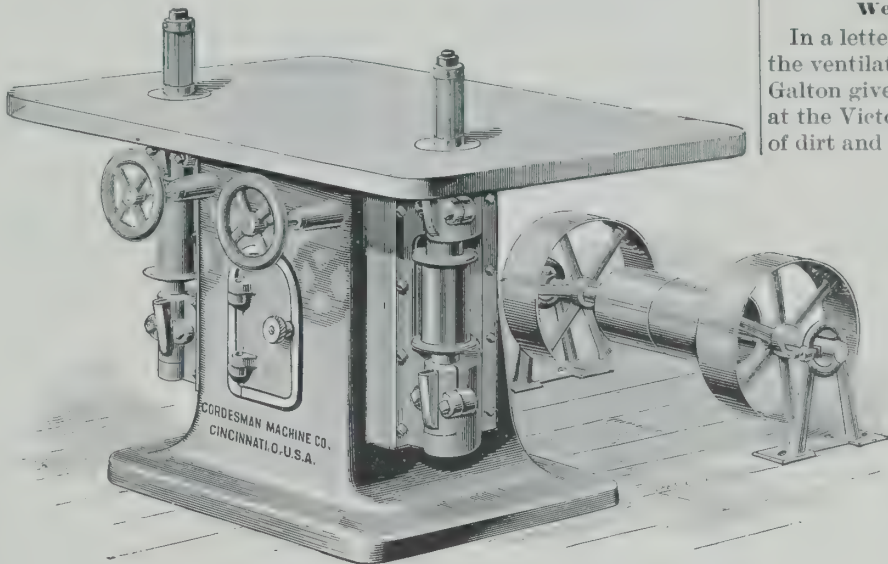
**A VERTICAL DOUBLE SPINDLE SHAPING MACHINE.**

The machine shown is extra heavy, for straight and irregular forms, and is especially suited for cooperage, agricultural and railroad work, where a good, substantial machine is wanted to stand up to the very heaviest work. The column is heavy, and the metal well distributed. It is cored out and cast in one large piece. The spindles, which are long, stiff, accurately turned and truly ground, are made of  $1\frac{3}{4}$  inch steel, measuring  $1\frac{1}{4}$  inches in diameter above the table, and placed 30 inches apart from center to center. They can be adjusted vertically by means of screws on inside of column, which are operated by the hand wheels in front of the machine. The iron table, which measures  $4 \times 4\frac{1}{2}$  feet, is amply large for any kind of work. It is well braced, planed perfectly true, and fitted with concentric rings to suit various sizes and kinds of heads and cutters. The tight and loose pulleys on countershaft are  $12 \times 6\frac{1}{2}$  inches face, and should make 900 revolutions per minute. For further particulars of this machine address the Cordesman Machine Co., 24 to 34 Butler Street, Cincinnati, O., U. S. A.

**Shadow as Element of Design.**

Beauty of profile must succumb in this country from its highest place and be content to reign in conjunction with shadow, if not to be subservient to it; and it was the perception of this necessity which forms one of the great charms of Gothic and Norman architecture, and was the under idea of Sir C. Wren, as evinced in the detail, the ornament and the massing of his buildings. For shadow is so indispensable to the development of perfect character in a building that, when nature is not favorable to its production, all that human art can do should be done to obtain it. That the necessity for shadow is not, however, the same in all classes of buildings may well be supposed. For instance, the grander or stronger the character to be expressed, the less need there is of it. We may see this, as regards grandeur, in the Pyramids, in the wall of the Forum of Nerva and the walls of fortified towns, and, as regards strength, in the Pitti Palace, Florence, and the generality of Tuscan palaces—the Palazzo Thiene, Vicenza; the Palazzo Farnese (north), and most of the Roman palaces. In all these the simplicity of the form being essential to their effect, it follows that the shadows should possess the same character, and any complicate or broken shadows given them would be wrong, because not consonant with the nature of the containing forms. The most remarkable union of strength and shadow perhaps to be seen is St. Paul's, Covent Garden. But for the full development of a more truly beautiful character we may turn to the temples and monuments of ancient Greece and Rome, where shadow is carefully studied, and expresses the beauty of the various forms, as in the fronts of the Parthenon, Pantheon, the triumphal arches, the Colosseum, and in modern works in the Basilica, Vicenza; the loggie of the Vatican; the Palazzo Bevilacqua, Verona; the Lions' Court of the Alhambra; the Library of St. Mark, Venice; and Whitehall. There can evidently be no rule for the quantity of shadow appropriate to so many different grades of the beautiful in architecture, but we may be pretty sure from these excellent examples that the shadow should be of a medium power, not superior to the form, and consequently that all projections and recessions in massing or ornament should be of a medium character also, obtaining neither the largeness of the grand nor the brokenness and depth of the picturesque. Whatever style of architecture we adopt, it is not sensible to make use of those

exact forms of mass or detail which were intended for an entirely different climate and for an effect which we in England can seldom, if ever, hope to obtain. But the shadow which nature has denied us may still be gained by the effective, because sensible, practice of northern art—by deeply cut mouldings, great recession of apertures or great projection, if the nature of the wall does not admit of the former, and ornament thoroughly pierced. All will hold shadow in themselves strong and expressive, though no sun should touch them, and doubly charming when so relieved. But in designing it should be remembered that parts which hold shadow in themselves, such as moulding, ornament, etc.,



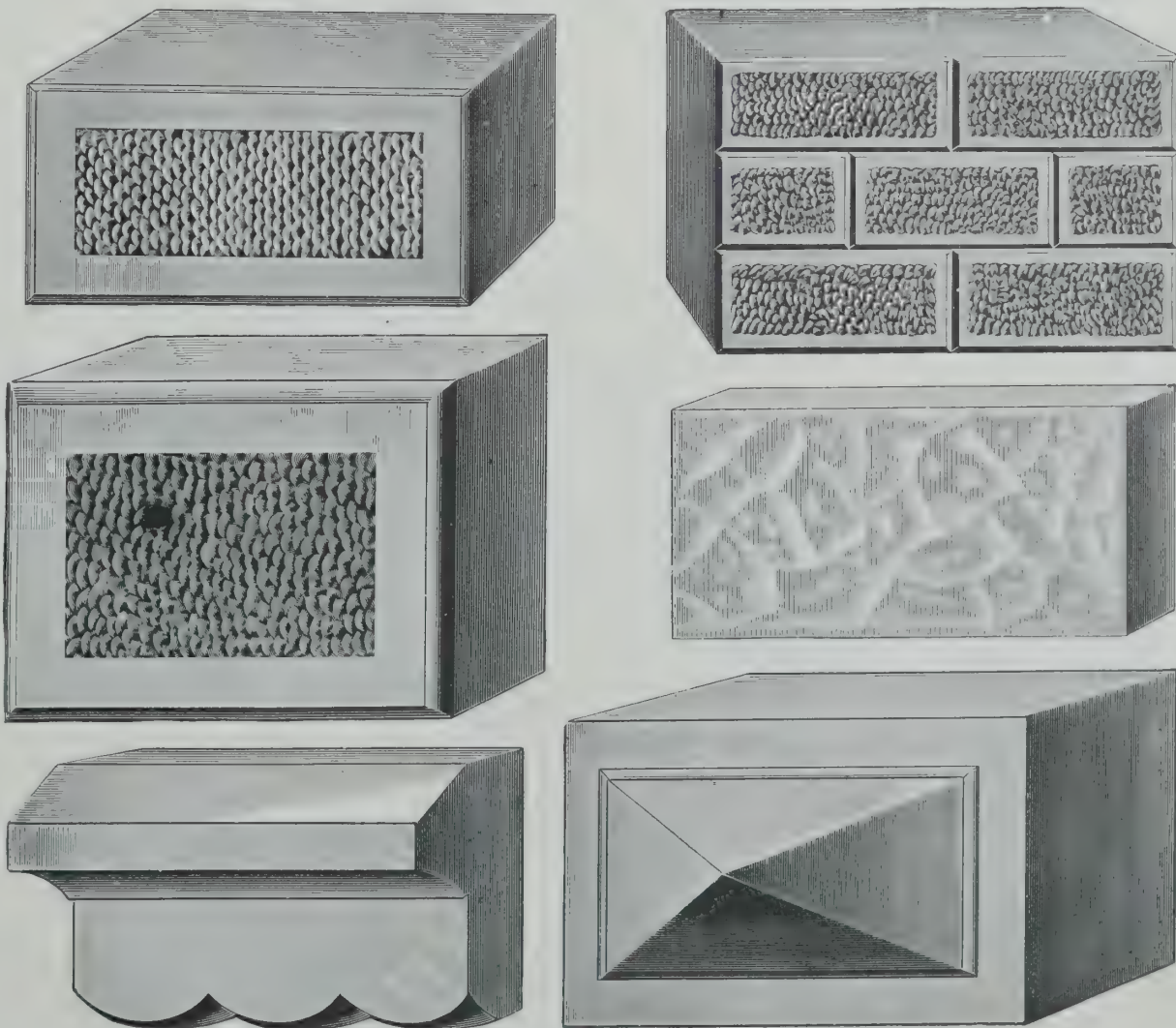
THE CORDESMAN MACHINE CO.'S SHAPING MACHINE.

should not be confounded with those which shadow another part, as in eaves, angles, walls and detached columns. These do not hold darkness to nearly the same degree, and this degree is weakened as they extend or project. There is no case where the extra and needless expense of detached columns is more seen than in the School of San Rocco, Venice, facing the north.—*The Architect.*

**ARTIFICIAL BUILDING STONE.**

The accompanying illustrations represent some of the most popular styles of blocks of artificial building stone prepared by E. L. Martin, of No. 628 N. Main Street, Decatur, Ill. The kinds shown are usually kept in stock, in sizes  $8 \times 16$ ,  $10 \times 16$ ,  $10 \times 24$ , and others, and from four to eight inches thick, so that a bill of stone can be furnished to architects and builders within a few days after the order is given. Window sills and ashlar stone and ornamental belt are always kept on hand.

Mr. Martin has had many years' experience in this line of business, and in the making of cement walks.



MARTIN'S ARTIFICIAL BUILDING STONES FOR ARCHITECTS AND BUILDERS.

His fine office building in Decatur is an example of a handsome structure made entirely of artificial stone, and he recently erected an entire front of ornamental stone for a building of the Mueller Mfg. Co. Mr. Martin's success in making the best sidewalk known, of artificial stone, has been something phenomenal, and he has obtained such a reputation in this branch that many go to him for instruction, for which he charges a special fee. His efforts have always been directed to making the best possible article, a stone that does not shell off or crumble, and which frost will not affect, and a sidewalk that will be unequaled in durability and always retain its smoothness of finish.

**Wet Screens for Ventilating Ducts.**

In a letter in the *Times* of January 26, in regard to the ventilation of the House of Commons, Sir Douglas Galton gives a description of the "wet screen" in use at the Victoria Infirmary at Glasgow for the removal of dirt and fog from the air previously to its entering a building. He gives the following description of the process: "In this infirmary the air is renewed six times an hour. This volume of air before it enters the wards is filtered and washed by being passed through an air-washing screen of cords, formed of horse hair and hemp, closely wound over a top rail of wood and under the bottom rail, forming a close screen, sixteen feet long by twelve feet high, affording nearly 200 square feet of surface. There is a constant trickling of water down this screen, by which it is kept wet, and the air, in filtering through it, has the dust and soot particles removed, and when once these have adhered to the wetted surfaces, a current of air of considerable velocity will not carry them through the screen, but the falling water floats them down into the drain. An automatic flushing tank is fixed in a position whereby twenty gallons of water is instantaneously discharged over the surface of the screen every hour, to flush and remove any accumulation of wetted dust, soot, or germs which may not be removed from the screen by the trickling water over its surface." Sir Douglas Galton recommends this method as one which, among other advantages, will keep fog from entering into the ventilating chambers and hence into the building; and states that on very foggy days the air within the infirmary was perfectly clear and pure.—*The Builder.*

**Irrigation in Nevada.**

According to Census Bulletin No. 163, there are 1,167 farms in Nevada that are irrigated out of a total number of 1,341. The total area of land upon which crops were raised by irrigation in the census year ending May 31, 1890, was 224,403 acres, in addition to which there were approximately 280,000 acres irrigated for grazing purposes. The average size of the irrigated farms, or, more strictly, of irrigated portions of farms on which crops were raised, is 192 acres. The average first cost of water right is \$7.58 per acre, and the average cost of preparing the soil for cultivation, including the purchase price of the land, is \$11.82 per acre. The average present value of the irrigated land of the State, including buildings, etc., is reported as \$41 per acre, showing an apparent profit, less cost of buildings, of \$21.60 per acre. The average annual cost of water is \$0.84 per acre, which, deducted from the average annual value of products per acre, leaves an average annual return of \$12.08 per acre.

**TO GET RID OF FLEAS.**—Place the common adhesive fly paper on the floors of the rooms infested, with a small piece of fresh meat in the center of each sheet. The fleas will jump toward the meat and adhere to the paper.



## THE ANDREWS METAL CHAIR.

The chair shown in the accompanying illustration is made of steel twisted together by special machinery invented for the purpose. The style shown has a plain veneer seat, but the seats are also made of quartered oak or mahogany, and upholstered in plush or leather, while the frames are enameled in any color, and are also made in antique copper and brass finish. The chair is designed to make an attractive, durable and highly useful piece of furniture for a drawing room, reception room, or dining room, while also especially



THE ANDREWS METAL CHAIR.

adapted for use on the lawn or veranda, and for halls and other public buildings. It is manufactured by Messrs. A. H. Andrews & Co., Nos. 215 to 221 Wabash Avenue, Chicago.

## A PLUMBER'S BLAST FURNACE.

In 1878, the Haines, Jones & Cadbury Co.'s blast furnace was put upon the market. Since that time 25,000 furnaces have been sold. Improvements have been added from time to time until it has been brought to its present perfection. The furnace may be briefly described as follows: The reservoir, which holds about one gallon of gasoline, is made of I-XXXX tin, with malleable iron bottom ring and galvanized cast iron top plate. This top plate is tapped for three uprights to support the solder pot; for a filling screw; for a feed pipe, through which the gasoline is conducted through a coil to the burner; and for a small cock through which air is forced into the reservoir by means of a rubber inflator. On top of the three supports is a malleable iron ring, upon which is placed the shield for holding the solder pot. Suspended from this ring is an iron cup which incases a wrought iron coil through which the gasoline is forced by air pressure to the burner connected at bottom of coil.



The furnace is used as follows: It is filled about half full of gasoline. The valve controlling feed pipe to coil is then closed, and the reservoir is charged with air; upon opening valve the gasoline is forced up through and down the coil and lighted at burner. The flame, confined by the cup, burns up around the coil, heating the gasoline within the coil and forming it into vapor, which forms a constant flame upon emerging at burner. Its intensity can be regulated at will by shutting or opening the needle valve. The cup around coil and burner catches any gasoline which may through carelessness of the operator be forced through before applying the match, and also assists materially in confining the flame, and creating an upward draught about the coil, there being holes punched in the cup for admission of air. The solder pot is placed within a sheet iron reverberatory shield, so made that it will throw the heat upon the pot to the greatest possible advantage. The furnace will melt ten pounds of solder in six minutes, at a merely nominal expense, and gives out no smoke nor smell. It weighs but seven pounds, so can readily be carried in connection with the outfit of a plumber or tinsmith.

The shield can be of any size or shape, and there is an increasing demand for the furnace supplied with an oblong solder pot to be used by electric linemen for soldering together the ends of wire; which can be done by simply springing the wire into the pot, thereby saving much time and labor over the old way of pouring the melted solder on the joint. As the furnace is *sure* in its operation, and not affected by draughts, it can be used out of doors as readily as within a building. This fact, coupled with the many other advantages, has justly earned for it its present popularity.

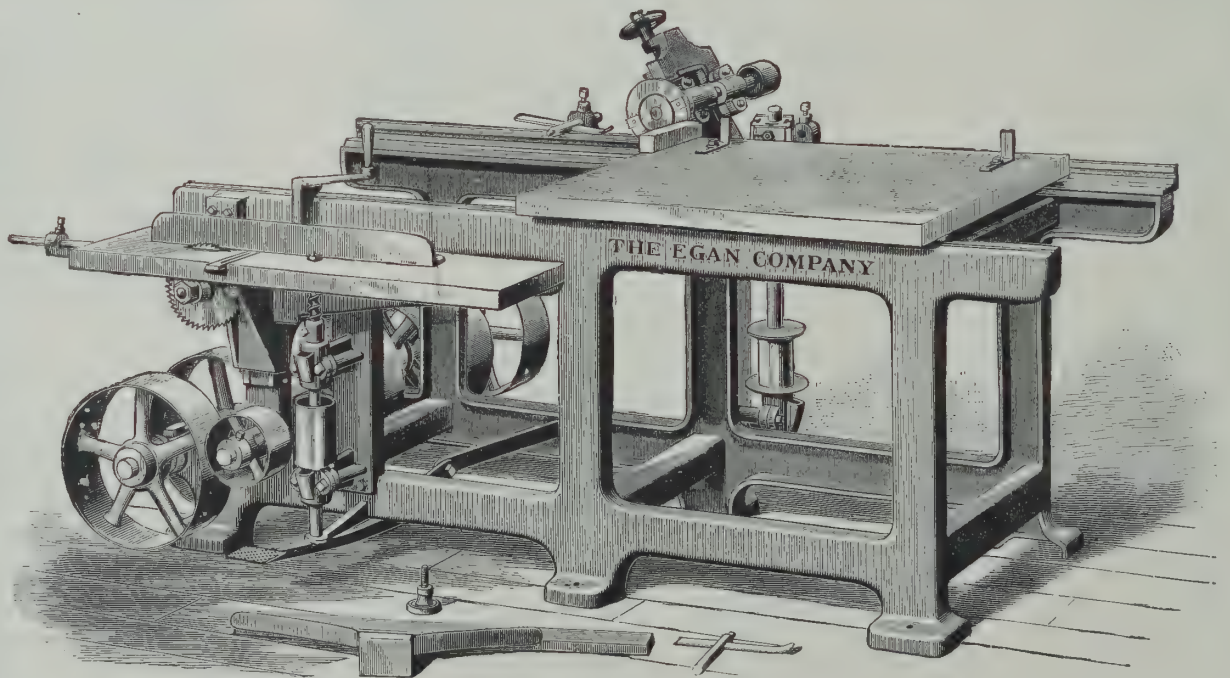
The manufacturers are Haines, Jones & Cadbury Co., of Philadelphia, Pa.

THE HOYT & BROTHER COMPANY, of Aurora, Ill., manufacturers of machinery for working wood, is the style of the recently reorganized manufacturing company started in Aurora in 1871. Owing to the death of Hon. C. L. Hoyt, and the contemplated retirement of L. P. Hoyt from active connection with the business, it became necessary to reorganize the company. The company is an evolution out of the old firm of the R. L. Carter Company, which succeeded the firm of Carter & Pinney, which firm was in turn succeeded by the Hoyt & Brother Mfg. Co., at which time Willis Hoyt identified himself with the concern as secretary and treasurer. They introduced the first successful double cylinder chain feed surfacer ever placed on the market. Following this successful venture came the gradual production of this class of machinery until twenty-three sizes of planers and matchers and eleven different and standard kinds of surfacers and other wood-cutting machinery were manufactured by this firm. This production was increased from year to year until at the present time the illustrated catalogue of the firm represents over 300 different sizes and patterns of wood-cutting machinery, all built in the highest style of mechanical art by skilled experts who have spent many years in acquiring proficiency in this class of work. Hon. C. L. Hoyt, who was at the head of the concern for so many years, is succeeded by his son, Mr. Willis Hoyt, the new president, who has the advantage of long association with his father in the conduct of the business.

## AN IMPROVED WOOD WORKING MACHINE.

The machine shown in this illustration is designed for finishing the edges of sash, and rabbeting, beading and jointing the edges of blinds, grooving and boring sash for the cords, and the endless variety finishing work of this kind in sash, door and blind factories. It is adapted to do the same amount of work that heretofore required three machines. The top of the frame receives a sliding table working in planed ways for working sash. A stationary table is also furnished for working blinds, when the three cutter heads are brought into operation at once.

The bed is also adjustable on the frame and is provided with a saw mandrel for cutting all kinds of grooves, and a boring mandrel, operated by a treadle, for boring the hole for the cord in the sash, which is then passed to the grooving saw, completing the job at one operation, without taking the sash from the table.



SASH AND BLIND, JOINTING, RABBETING AND FINISHING MACHINE.

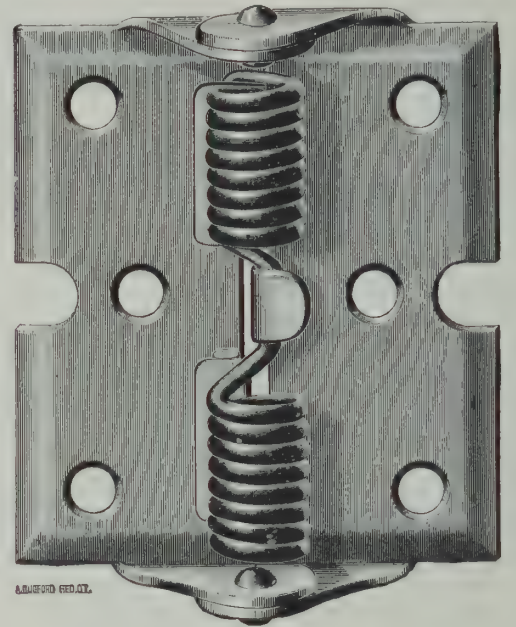
For further information address the builders, The Egan Company, 209 to 229 West Front Street, Cincinnati, O., U. S. A.

THE TIFFANY GLASS AND DECORATING COMPANY is the style of a new firm which has recently absorbed the Tiffany Glass Company. The work of the company covers a high class of house and church decorations and memorial work. In the house decorations the following lines are specialties in which original work is furnished: Frescoes, textile fabrics, hangings,

embroideries, upholsteries, furniture, mosaics, colored glass, gas fixtures, electroliers, metal work, etc. The directors of the new company are: Louis C. Tiffany, C. T. Cook, Henry W. De Forest, George Holmes, Pringle Mitchell, John C. Platt, John Du Fais, Von Beck Canfield. The address of the new company is 333 to 341 Fourth Avenue, New York.

## THE STEARNS HINGE.

The spring shown in the cut has three parts only, the two leaves and the spring, each leaf being one solid piece of wrought steel, and the spring being held by lips formed up from the leaves. The spring action is designed to hold the door stronger at the closing point, reducing the strain on the spring while increas-



THE STEARNS STEEL SPRING HINGE.

ing its efficiency and durability. Each pair is separately packed in a neat pasteboard box. This spring is made by Messrs. E. C. Stearns & Co., Syracuse, N. Y.

"SELECT MODERN BUILDINGS" is the title of a neat little picture book containing representations of a number of recent notable structures in New York and Brooklyn. It is issued by Messrs. Toch Brothers, New York, manufacturers of mortar colors, and the statement is made that in every one of these handsome, and high cost buildings the Toch "Edinburgh" mortar colors have been used.

THE CINCINNATI CORRUGATING CO. issue a very neat catalogue of their productions, including corrugated roofing, siding, ceiling, arches, lath, shutters, doors, etc., V-crimp iron roofing, standing seam plain roofing, roll and cap steel roofing, metallic weather boards, etc. This firm have recently established a rolling mill, galvanizing works, tin plate works, and factory at Piqua, O. The manufacture of roofing tin

plates at the Piqua factory is announced as an addition to the heretofore extensive business of the firm.

THE CAMBRIDGE ROOFING CO., of Cambridge, O., and Chattanooga, Tenn., have issued a new catalogue, got up in a way which indicates that business is prosperous with the company. The last cover page gives a view of their factory plant at their new works at the South, as well as their older factory in Ohio. The company make steel, iron, and tin roofing, with corrugated siding, ceiling, doors, and shutters, etc.





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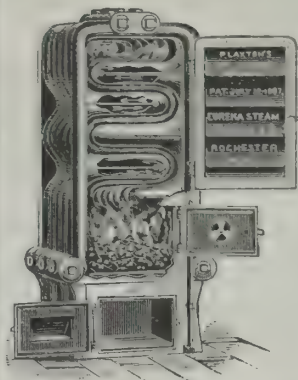
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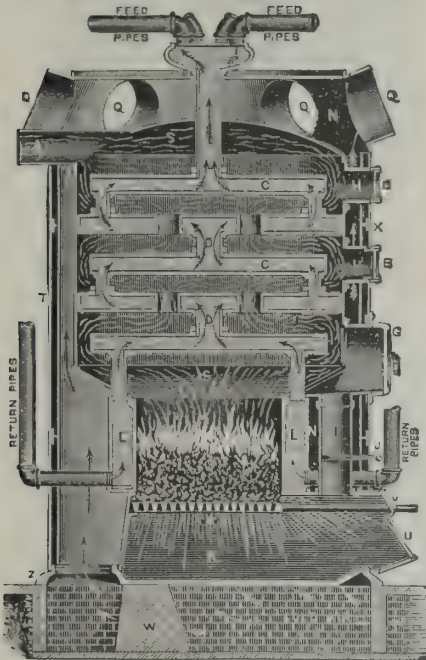
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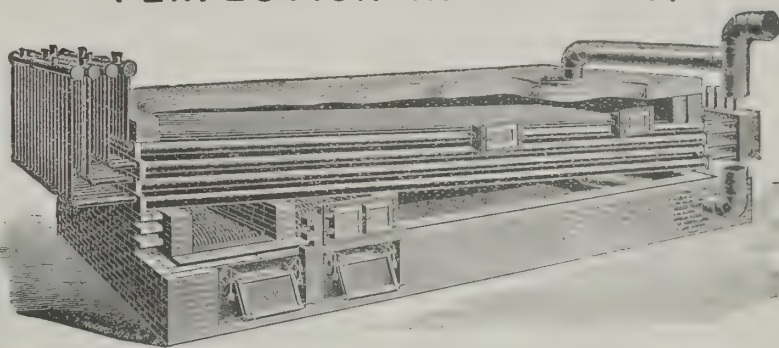
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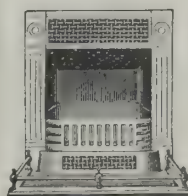
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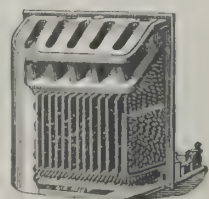
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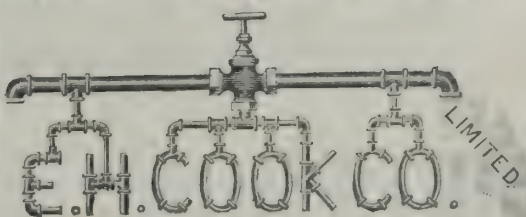


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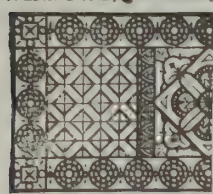
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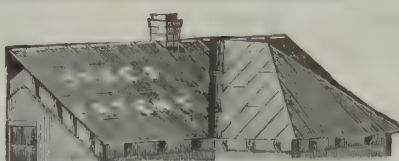
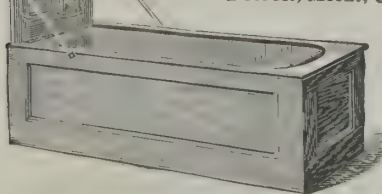
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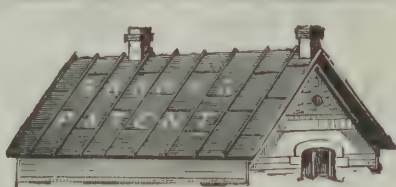
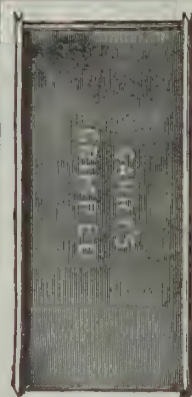
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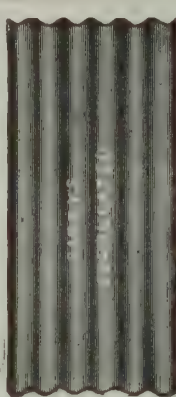
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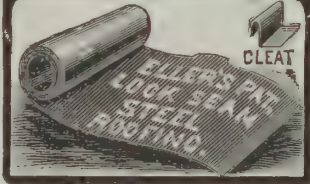
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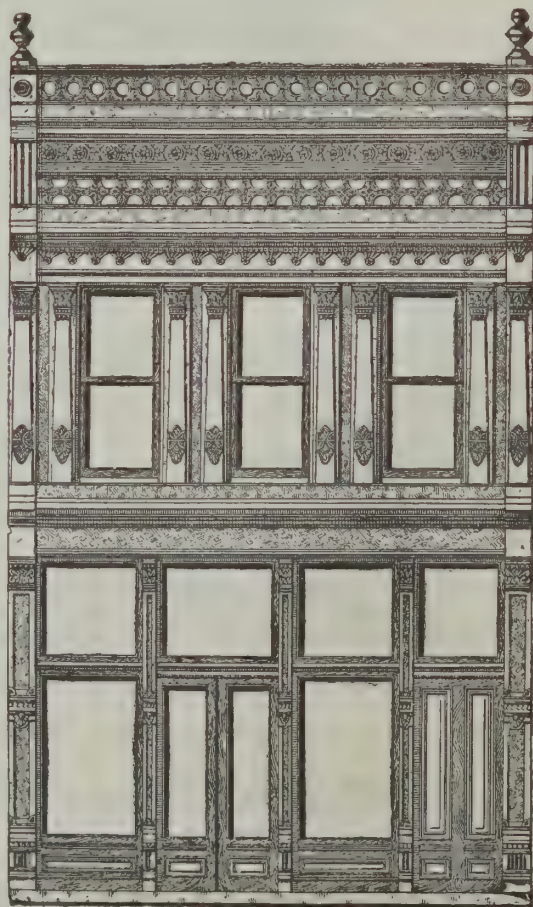
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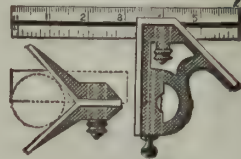
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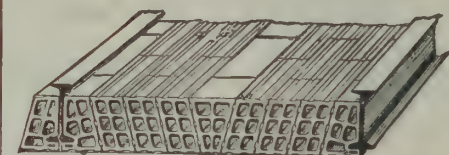
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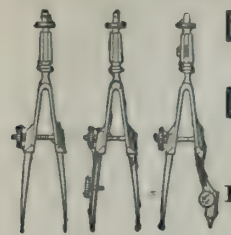
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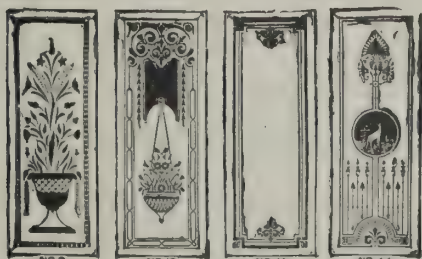
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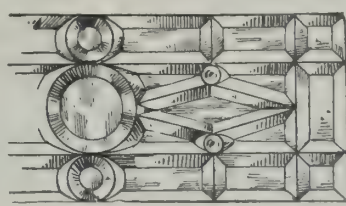
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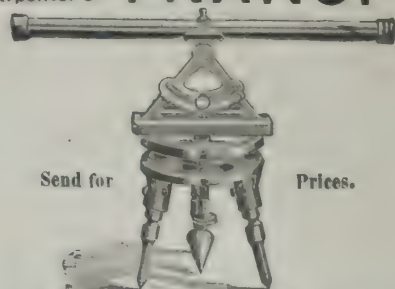


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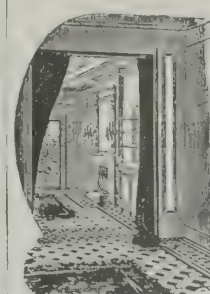
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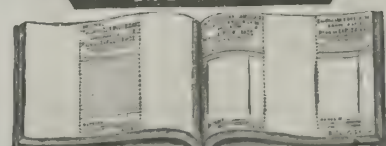


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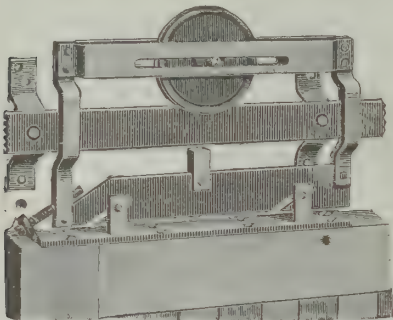
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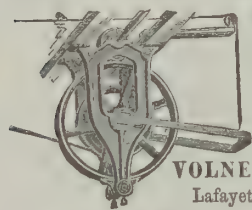
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(Continued on page vi.)

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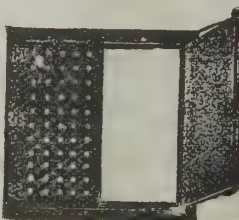
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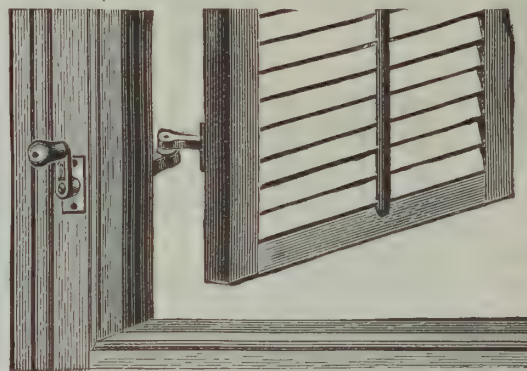
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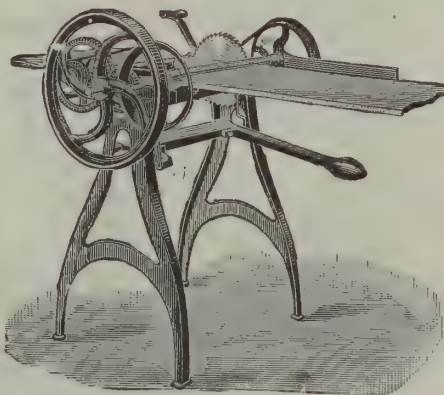
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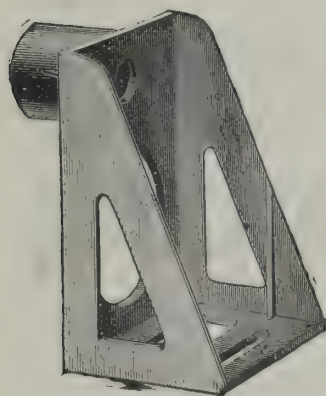
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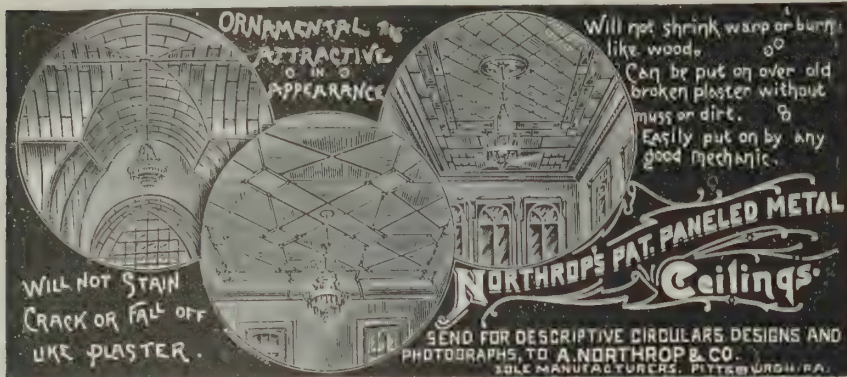
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(Continued from page iv.)

sal soda and hot water does not entirely remove. A. Take one part calcined soda and allow it to stand 1/4 hour in 1 part elated lime, then add 15 parts water and boil. Spread the solution thus obtained upon the floor with a rag and after drying rub with hard brush and fine sand and water. A solution of 1 part concentrated sulphuric acid and 8 parts water will enliven the wood after the above application. When dry, wash and wax the floor.

(4) W. S. asks: 1. What horse power can I get from 150 inches of water, velocity 257 feet per minute, on 15 feet overshot wheel? A. The whole value of your water flow and fall is 7 1/2 horse power, of which you may realize, with a good overshot wheel, 5 horse power. 2. Is the pressure on inclined water pipe computed by its perpendicular only? A. The value of the pressure is due to the vertical height.

(5) F. D. P. writes: I inclose herewith a problem for your correspondence column. It was given by a man at our school and there was quite a diversity of opinion in regard to it. A solution from you will greatly oblige. I would also like a little information on another matter which I also inclose. Have been greatly entertained by some of the questions in your paper. 1. A tank 10 feet inside diameter, 232 feet high, made of 4 inch staves, is hooped with 6 inch iron hoops 12 inches apart. What is the pressure per square inch on third hoop from bottom, allowing 2'03 feet to equal one pound? A. The pressure against the sides of the tank at the third hoop is equal to 230 feet hydrostatic pressure, or 100 pounds per square inch. To get the pressure or strain on the third hoop, multiply the pressure by one-half the diameter in inches, which we make 6,000 pounds for one inch height. Now, as you say that the hoops are 1 foot apart and 6 inches wide, this makes 18 inches in height between the centers of the spaces for each hoop to hold—6,000×18=108,000 pounds strain upon the hoop. Now if the hoops are half an inch thick, there will be but three square inches of metal, and as iron hoops should not be trusted for more than 20,000 to the square inch in any case, you have 3×20,000=60,000 pounds safe resistance against 108,000 pounds strain. Such a tank could not be filled with safety. 2. What metal possesses the quality of expanding and contracting in the greatest degree with temperature from 40° to 80° Fah.? A. Zinc has the greatest range of expansion and contraction of the solid metals, being eight-tenths of an inch in 100 feet for a difference of 40° Fah. 3. How much does an iron rod 1/4 inch by 1/4 inch, 2 feet long, expand in length for a change of temperature from 40° to 80° Fah.? A. For the iron rod 2 feet long, the change of length would be equal to 64 ten thousandths of an inch for a change of temperature of 40° Fah.

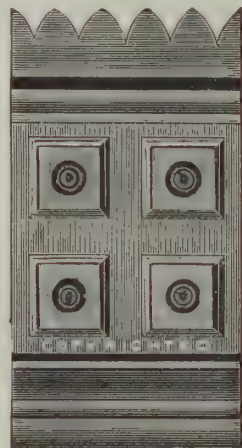
(6) C. M. D. asks if there is anything with which we can treat the inside of a new wood cistern, that will penetrate the wood and act as a preservative and at the same time not affect the water. A. Apply melted paraffine with a paint brush to the dry wood; moisture will prevent penetration.

(Continued on page viii.)

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(Continued from page vi.)

(7) E. A. H. writes: The basement walls of my house have a coating of tar on the inside. What mixture of paint can I use that will dry thoroughly on the tar? Can I mix anything with cement that will cause it to adhere to the tar? A. A solution of shellac in alcohol may be used, and applied like paint over tar that is to be painted. Its high expense prevents the application of this on a large scale. Cement cannot be made to adhere.

(8) S. R. T. asks the approximate heating value, and the relative bulk, of a ton each of good soft bituminous coal, anthracite coal, and coke, for use in cook stoves, hot air furnaces, and grates. A. Both anthracite and bituminous coal vary in heating value, owing to varying amount of ash, so that a special comparison can only be made with coals of similar amounts of combustible to the pound. The best coals of either kind are nearly alike for given weights. The bituminous coals from different mines vary so much, and the method of firing is so variable, that the results of experimental tests do not agree, as for instance trials on the Baltimore & Ohio Railroad determined the evaporative effect of one ton Cumberland as equal to 1.25 tons anthracite. Other experiments make bituminous coal 13 per cent more effective than coke for equal weights. The average of a long series of experiments on U. S. naval vessels makes anthracite 41 per cent more effective than bituminous. For domestic purposes, as cooking and heating, the cleanliness, durability, and convenience of an anthracite fire set it far ahead of any other coals or coke.

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(12) C. C. wants to know how many coats of lacquer should be put on gas fixtures, for ten years' wear, and how to make the different colors. Can it be put on hot? If so, what is the process? A. Only heat the articles to about 200° Fah. before lacquering. For the process and how to make lacquer, see "Techno-Chemical Receipt Book," which we can mail for \$2.

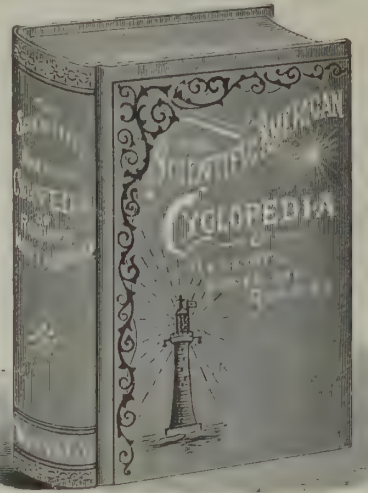
(13) F. M. desires a formula for making dark mahogany stain from aniline for furniture and chairs, one that will not fade. A. We would recommend the following in preference to aniline. Boil half pound madder and 2 ounces logwood chips in 1 gallon water and brush well over while hot. When dry go over with pearlsh solution, 2 drachms to the quart. By using it strong or weak, the color can be varied.

(14) H. G. R. says: I have just laid a galvanized pipe. 1 1/4 inch, from spring to house, a distance of 300 feet. As you do not recommend the use of galvanized iron, can you tell me any way to remove the zinc from the inside of pipe without digging it all up? A. Owing to the unavoidable liberation of gas and the position of the pipes, solvents cannot be depended upon to effectually remove all the zinc coating from such a conduit. We know of no practical way of satisfactorily accomplishing this without disturbing the line.

(Continued on page xii.)

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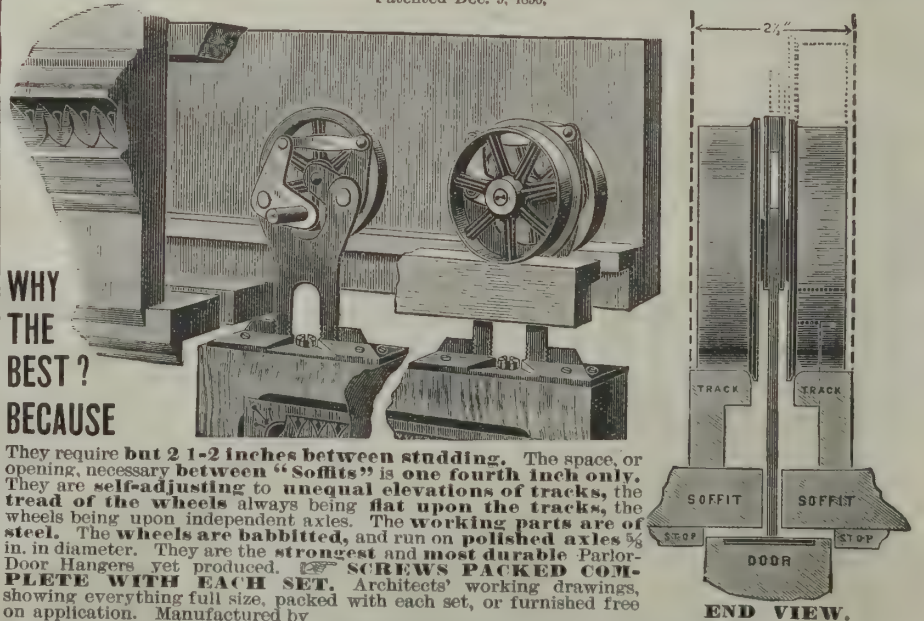
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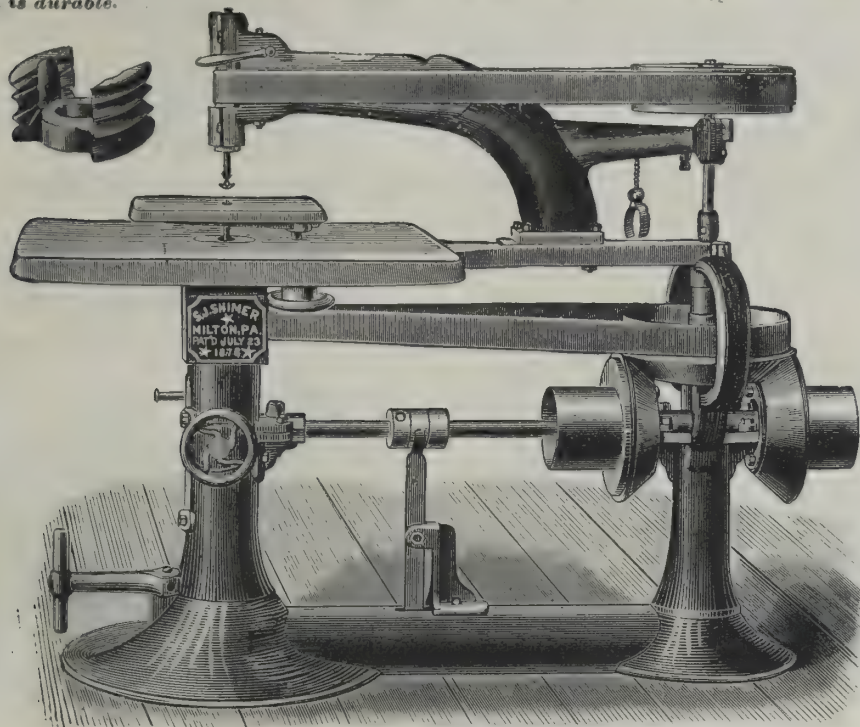


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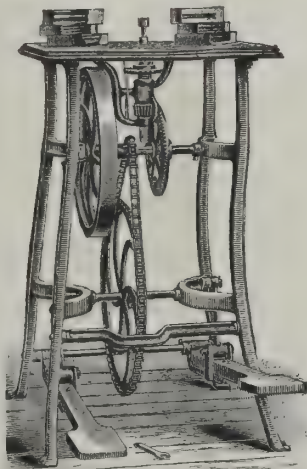
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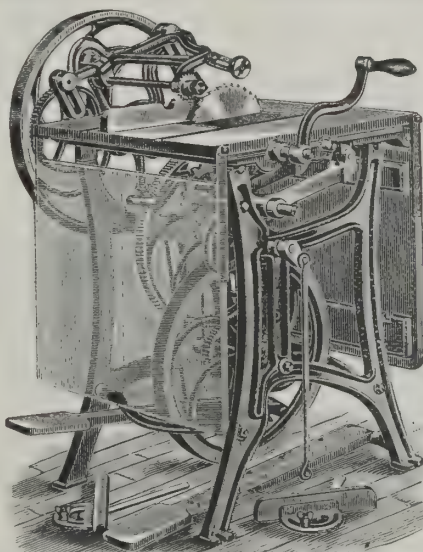
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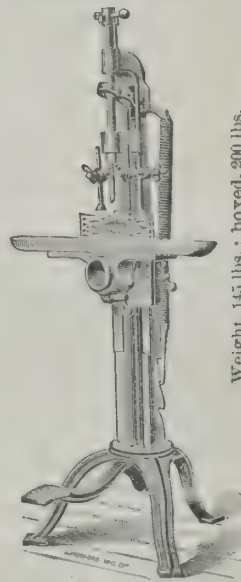
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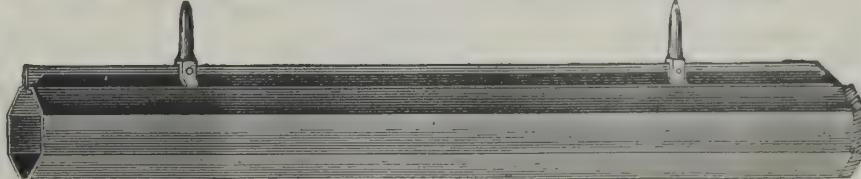
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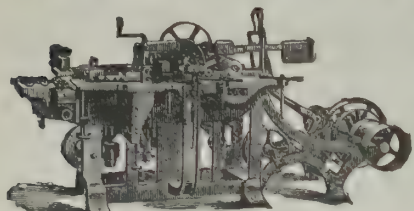
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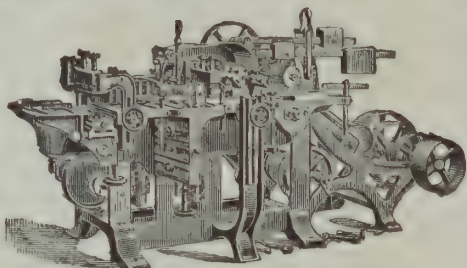
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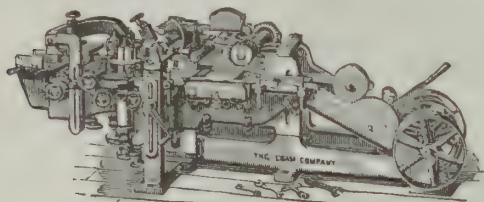
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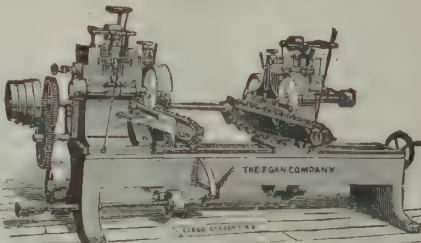
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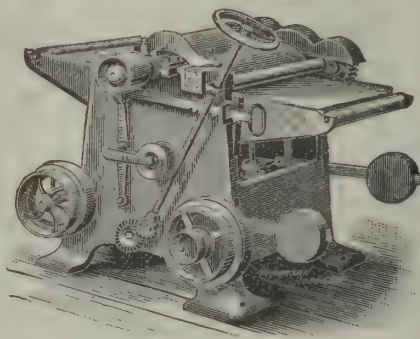
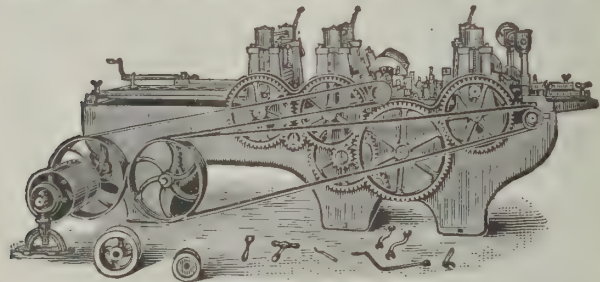
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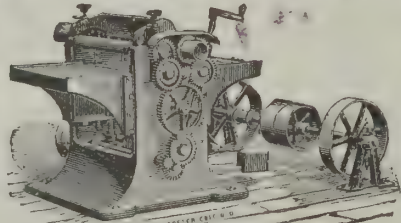
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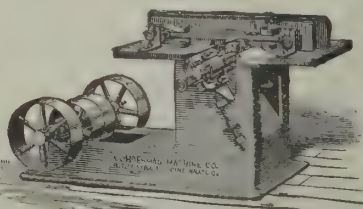
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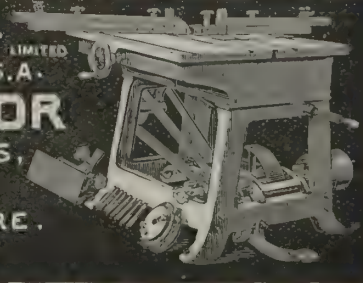
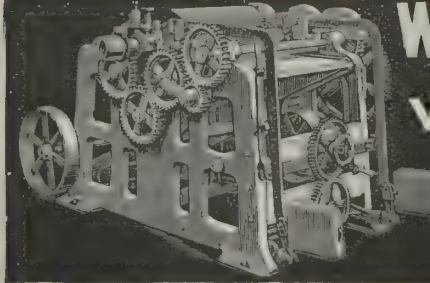
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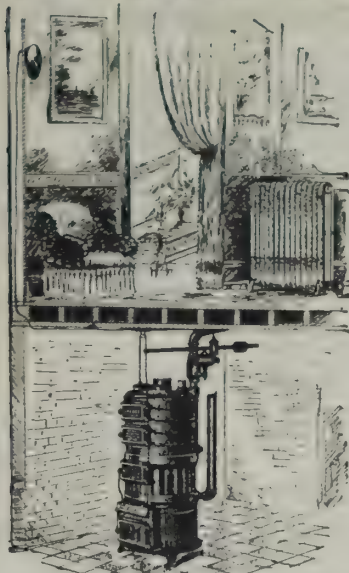
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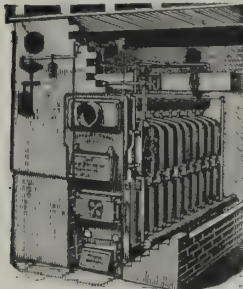
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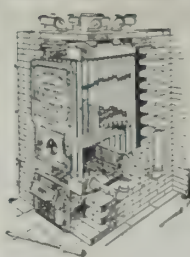
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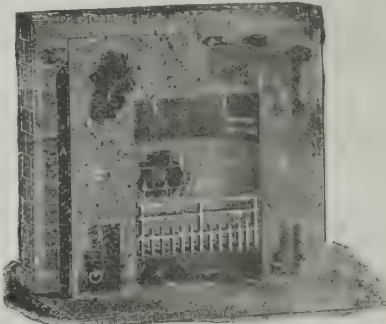
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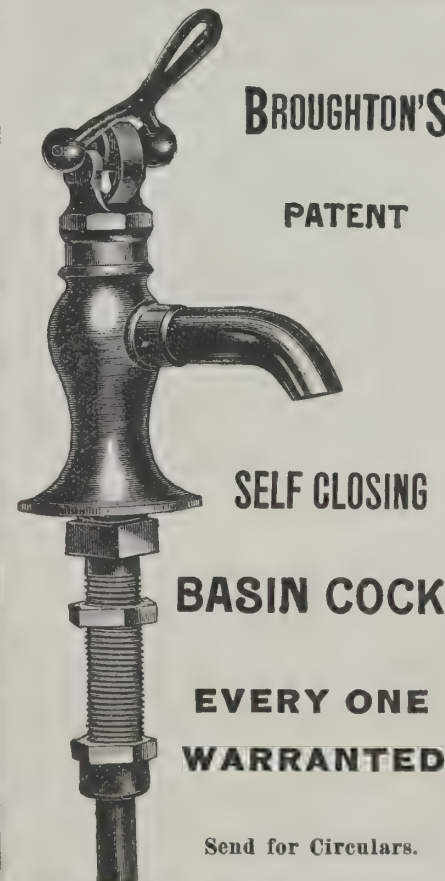
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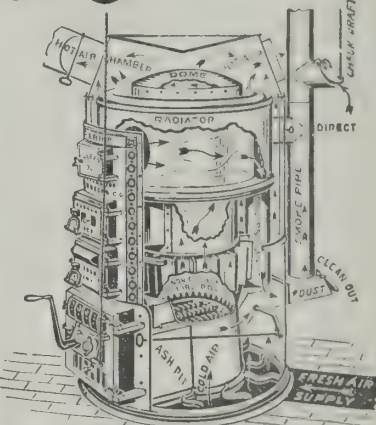
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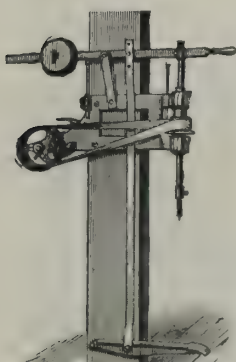
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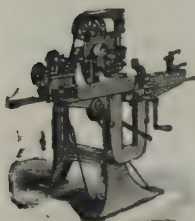
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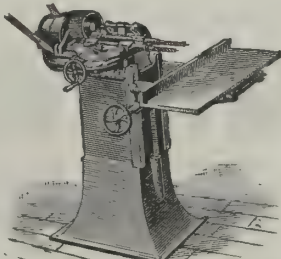
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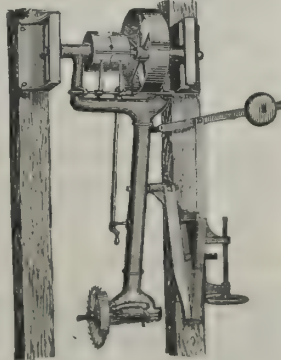
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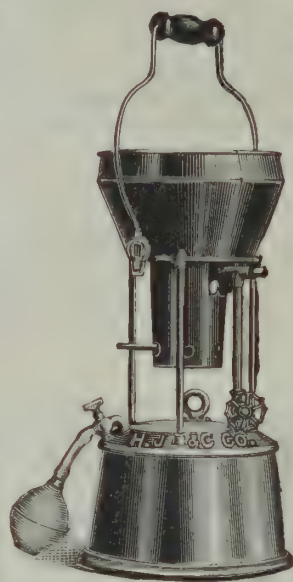
(16) G. I. writes: Can you tell me through your paper how water can be sucked up a hill. 50 or 60 rods long, with an elevation of 60 feet, by the use of a windmill, without triangles and have the mill above the spring? A. You cannot draw the water higher than from 20 to 25 feet with certainty. You may place a windmill and pump above the spring so as not to lift over 25 feet and force the water to the required height. This, with a windmill of moderate height, should give a fair working power for ordinary uses, and is preferable to the bell crank connections for any considerable distance.

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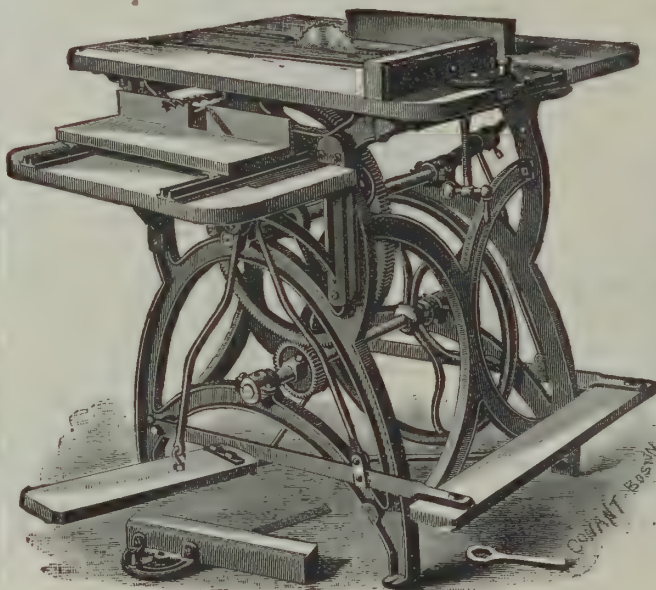
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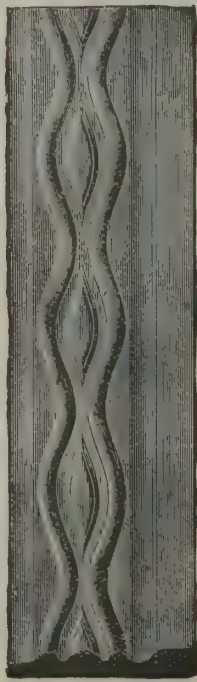
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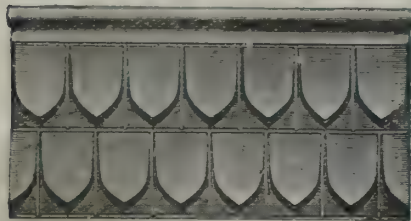
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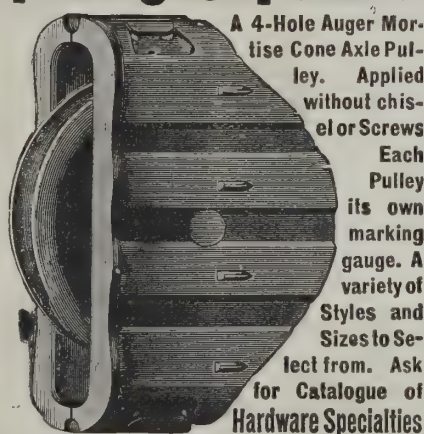
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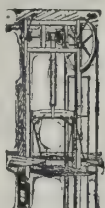
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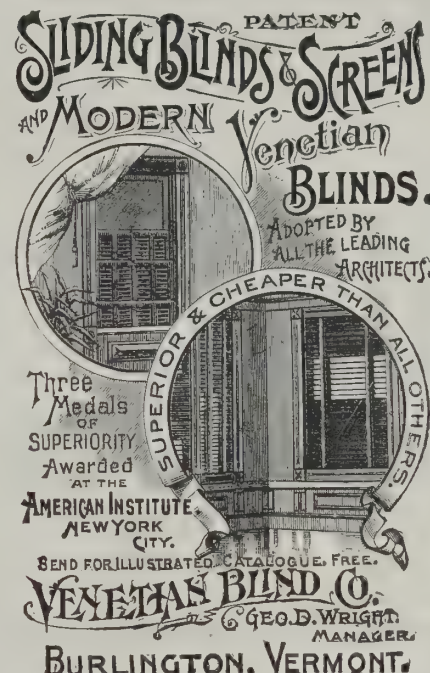
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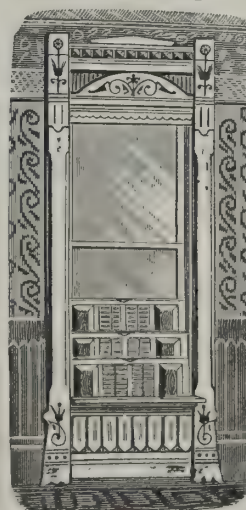
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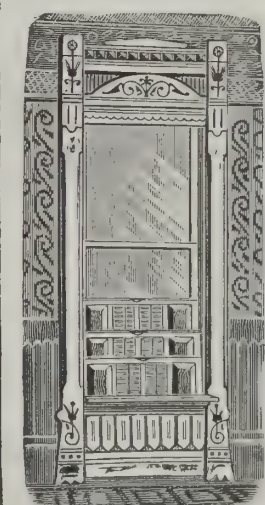
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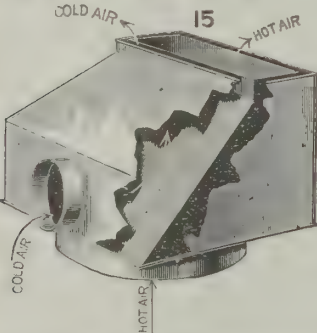
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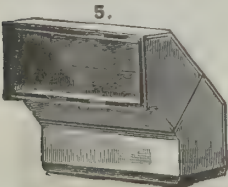
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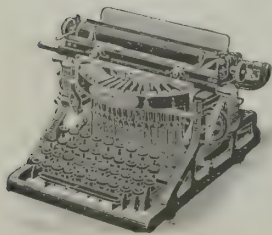
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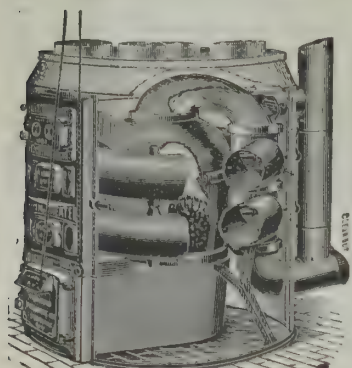
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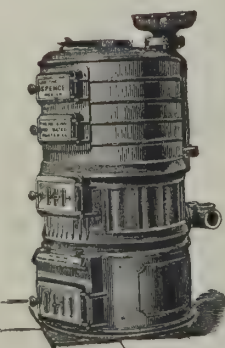
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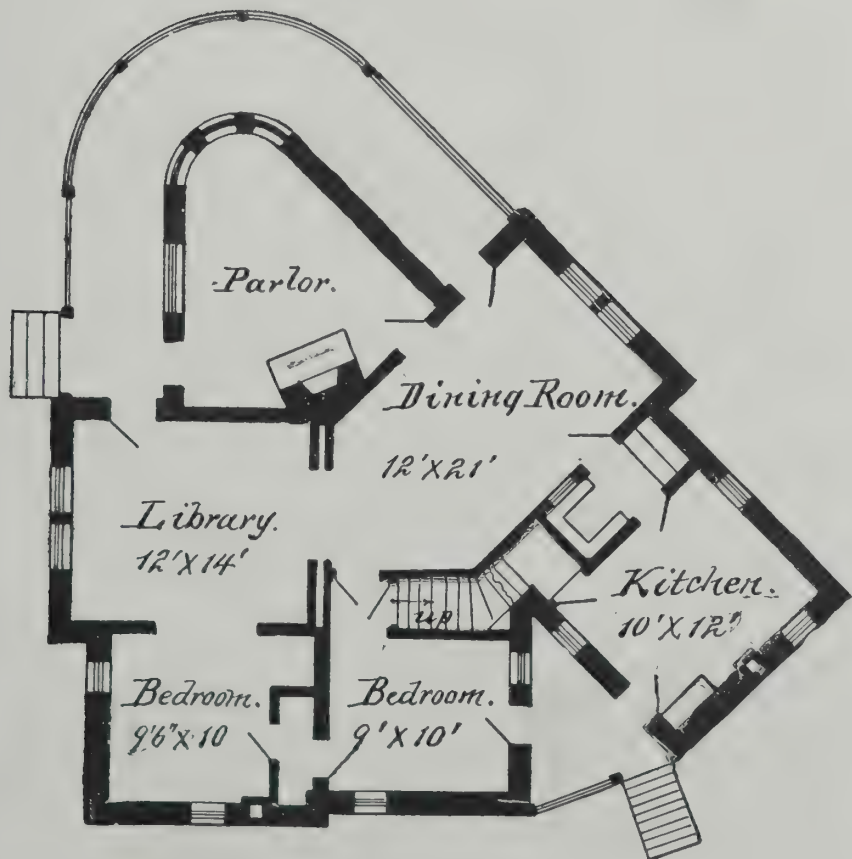
AND BUILDERS

EDITION.

Vol. XIII. Subscription, \$2.50 a Year.

NEW YORK, MAY, 1892.

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Floor Plan.



Basement Plan.

A ONE STORY BRICK COTTAGE

[See page 66.]





# Scientific American.

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O. D. MUNN.

A. E. BEACH.

NEW YORK, MAY, 1892.

THE

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Of the May number of the ARCHITECTS AND BUILDERS EDITION of SCIENTIFIC AMERICAN.

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#### A ONE STORY BRICK COTTAGE.

The one story and attic cottage shown on page 65, built at Richmond, Mo., for Dr. W. M. Quarles, has a stone foundation, with open work brick under front porch. Basement is excavated, except under parlor. Porch, foundation, and wall of building are of pressed brick, laid in white mortar. The gables are shingled. A veranda extends around the front portion of the building; there is also a triangular porch in the rear. The kitchen has a hard wood floor, and is wainscoted 2 ft. 8 in. high. All other parts have a neat moulded base, and all rooms have moulded casings and head or corner and plinth blocks. Parlor is finished in gum, all other parts in yellow pine; all finished in the natural. Principal rooms have picture mouldings. Parlor has a grate, with cherry mantel and bevel plate mirror. A pantry between the dining room and kitchen is fitted up with shelves, work table, flour and meal chest, and drawers. Kitchen has an iron sink and waste pipe; parlor has a bay window front, with bent glass. There is a stairway leading to the attic, where there are two large rooms and an unfinished bath room over the kitchen, and a fancy room over the parlor. The cellar has an outside entrance; also an entrance from the kitchen, under the attic stairway. The front doors have a special design—all others are 5 pan. P. G. All trimming hardware is bronze. Cost, about \$2,300. J. E. Cowdery, architect; L. P. Garrett & Co., builders.

Our engraving was made from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

#### A RESIDENCE AT BRIDGEPORT, CONNECTICUT.

One of our plates in colors this month illustrates a very handsome residence, erected for John E. Foster, Esq., at Sea Side Park, Bridgeport, Ct., from plans prepared by Joseph W. Northrop, architect, same place. On page 67 we present an additional view and plan. The design is well studied and it has many pleasing features, as will be seen in the engravings herewith. The underpinning is built of "rock faced" blue stone; steps to front piazza are of white granite. The exterior throughout is covered with shingles, painted gray, with pearl gray trimmings. Roof covered with cut slates. Dimensions: [Front, 50; side 64, exclusive of piazza and porch. Height of ceilings: cellar, 7; first story, 10; second, 9; third, 8'6". The entrance is through a paneled vestibule into a wide open hall, which is handsomely trimmed with quartered oak. This hall has a paneled wainscoting, hard wood cornice, and a low, broad staircase of oak, elegantly carved, with screen and newel post extending to ceiling. There is an entrance from the *porte cochere* at side of hall. The parlor and music room are trimmed with red mahogany. These apartments are separated by a screen supported on colonial columns, with carved capitals. In the space between the columns on either side are hung oriental lamps of oxidized silver. The fireplace, furnished with a tiled hearth and facings, with silver trimmings, has an ornamental mahogany mantel elegantly carved. The library, trimmed with cherry, has a bay window with stained glass transoms, and a fireplace furnished with a tiled hearth and mantel. The dining room is trimmed with quartered oak, and it has a paneled wainscot five feet high, an ornamental mantel and a carved buffet built in recess. Kitchen and pantries are trimmed and wainscoted with ash, and are fitted up respectively in the best possible manner. The second floor contains seven bed rooms, with large closets and bath room—all trimmed with poplar. The bath room is wainscoted and fitted up replete. The fireplaces have hard wood mantels. Third floor contains billiard and smoking room and two bed rooms, besides ample storage. Cemented cellar contains furnace, laundry and other necessary apartments. Cost \$17,000 complete.

Our engravings were made direct from photographs of the building taken especially for the SCIENTIFIC AMERICAN.

#### A COTTAGE NEAR PORTLAND, MAINE.

We illustrate in colors this month a summer cottage, erected for Mr. F. H. Morse, on Diamond Island, near Portland, Me. Dimensions: Breadth, 31 ft. 6 in.; depth, 44 ft. 6 in., not including piazza. Height of ceilings: First story, 9 ft.; second, 8 ft. 6 in. Although not a large house, the accommodations are generous, owing to the compact arrangement of the rooms. The spacious piazza is the special feature. Foundation, brick piers. First story clapboarded, except the space beneath piazza roof, which is ceiled, and painted light olive green, with dark olive green trimmings; second story shingled and painted olive yellow. Roof shingled and painted red. The interior throughout is trimmed with white pine, finished natural. The walls, ceilings, and partitions are ceiled with narrow beaded stuff. The living room contains an ornamental staircase, turned out of similar wood, and separated with a spindle transom and a fireplace built of brick, with hearth laid with same, and mantel of wood, with plate glass mirror. Dining room, good sized, has a buffet window glazed with stained glass. The floors are of yellow

pine, laid in narrow widths, and stained cherry. Kitchen, shed, and pantries are fitted up complete. There are four bed rooms, with large closets, on second floor. The piazza is inclosed, and it forms ample storage beneath the house. Cost, \$2,500 complete. Mr. F. H. Fassett, architect, same place.

Our plate was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

#### A SUMMER COTTAGE AT DIAMOND ISLAND.

Our engraving, page 68, presents a very attractive summer cottage, recently completed for Mr. Fred. Kendall, at Great Diamond Island, Maine. The plans show a spacious piazza and balcony on the exterior, while the interior contains a convenient arrangement of rooms, well-lighted and fitted up in a first-class manner. The house is set on cedar posts with stone foundations, placed eight feet on centers and well braced. The building above is put together in the style called balloon frame, with timbers of good size, suitable strength and finished in a thorough, workmanlike manner. The exterior framework is boarded up and down with spruce sheathing. The first story is clapboarded, and the second story and gables covered with cedar shingles and painted pearl gray with white trimmings. Roof is covered with cedar shingles and painted red. Dimensions: Front, 32 ft.; side, 40 ft., exclusive of front piazza. Height of ceilings: First story, 9 ft.; second, 8 ft. 6 in. Hall, parlor and dining room are trimmed and wainscoted in panels, 3 ft. 6 in. in height, with whitewood. These apartments also have ceiling beams. The walls above the wainscot are plastered one good coat of brown mortar, which is stamped in a novel fashion, with stamp similar to a butter stamp, but larger and of various designs; the walls being in one pattern and the frieze in another. Hall contains a staircase of excellent design, with newel post extending to ceiling, the space between being filled in with spindle transoms, thus forming a separation from parlor. The opening between parlor and dining room, and the arch over nook in the latter, have similar spindle transoms. Parlor and dining room have paneled divans and open fireplaces, built of brick and furnished with tiled hearths and mantels. The latter apartment has a buffet built in, with cupboard, drawers, shelves, etc. Kitchen, pantry, and second floor are ceiled with narrow beaded spruce, finished natural. The second floor contains four bed rooms and bath room replete. There is ample space in roof for storage, and the space beneath the house is utilized for this purpose. Cost \$2,000 complete. Mr. Antonio Dorticos, architect, Portland, Maine. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

#### A RESIDENCE AT BRIDGEPORT, CONNECTICUT.

We present on page 69 a residence erected for Willis F. Hobbs, Esq., at Bridgeport, Connecticut. The exterior is designed in the colonial style, and it presents a very pleasing example of this now fashionable style of domestic architecture. The underpinning is built of rock-faced bluestone; the building above is of wood, clapboarded and shingled and painted colonial yellow, with white trimmings. Blinds painted bronze green. Roof stained moss green. Dimensions: Front, 41 ft. 6 in.; side, 48 ft., exclusive of piazza and *porte cochere*. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The interior is arranged with reference to comfort and convenience. The wide hall opens at front by sliding doors into reception room and parlor toward the middle of house. The hall connects with dining room and den, and also with rear hall, containing back stairs, up and down, leading to kitchen. The dining room and den are somewhat separated from the open part of the house, a feature desired by the proprietor. The first floor is handsomely finished with hard wood. The hall and dining room are trimmed with quartered oak, reception room with bird's eye maple, parlor cherry, and den with quartered sycamore. The fireplaces, where shown, are built of brick and furnished with tiled hearths and hard wood mantels of exquisite design. Kitchen and its apartments are trimmed and wainscoted with yellow pine and furnished complete in the best possible manner with the usual fixtures. All the rooms are lighted with large windows glazed with plate glass. The second floor is trimmed with whitewood finished natural, and it contains five bed rooms, dressing and bath rooms. The bed rooms are well provided with closets, and the bath room is wainscoted and fitted up complete. Two bed rooms on third floor, besides ample storage room. Cemented cellar contains a furnace, laundry and other necessary apartments. Cost, \$7,500 complete. Mr. Joseph W. Northrop, architect, 328 Main Street, Bridgeport, Conn. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

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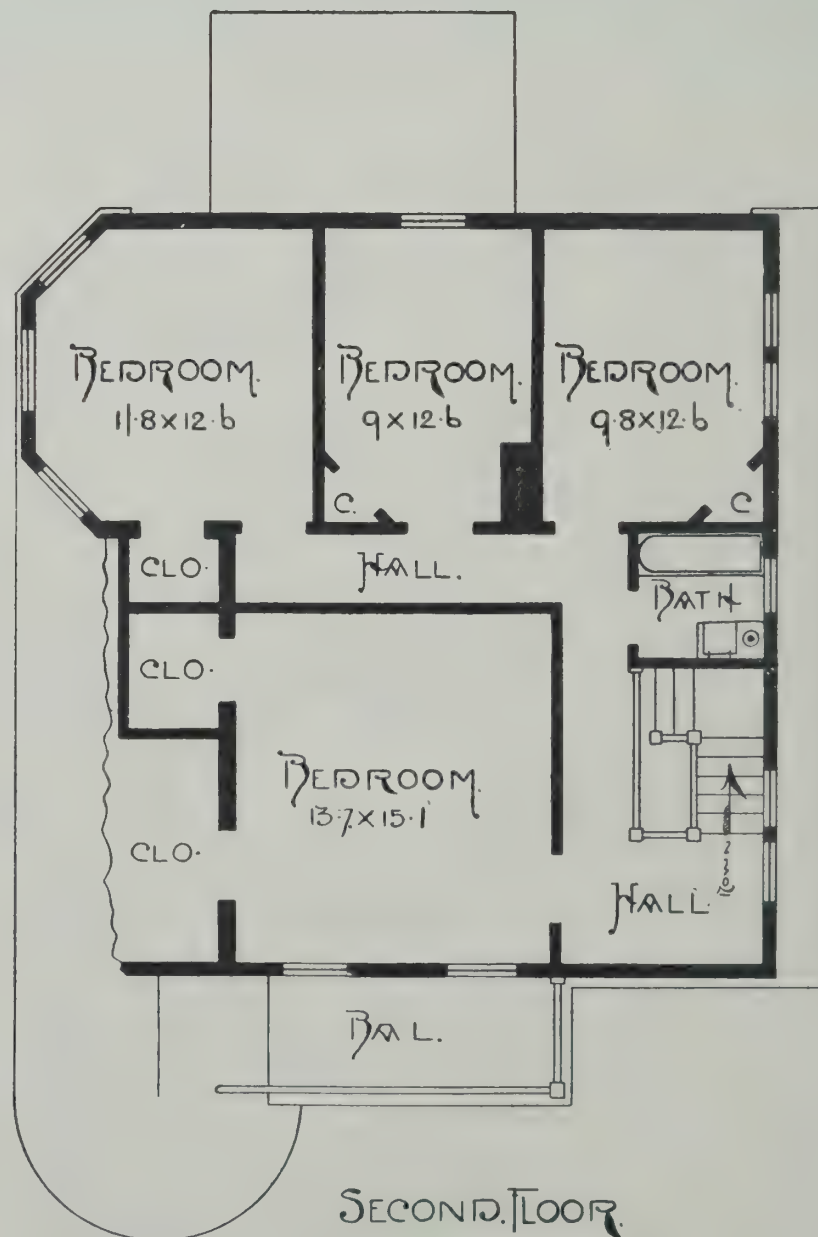
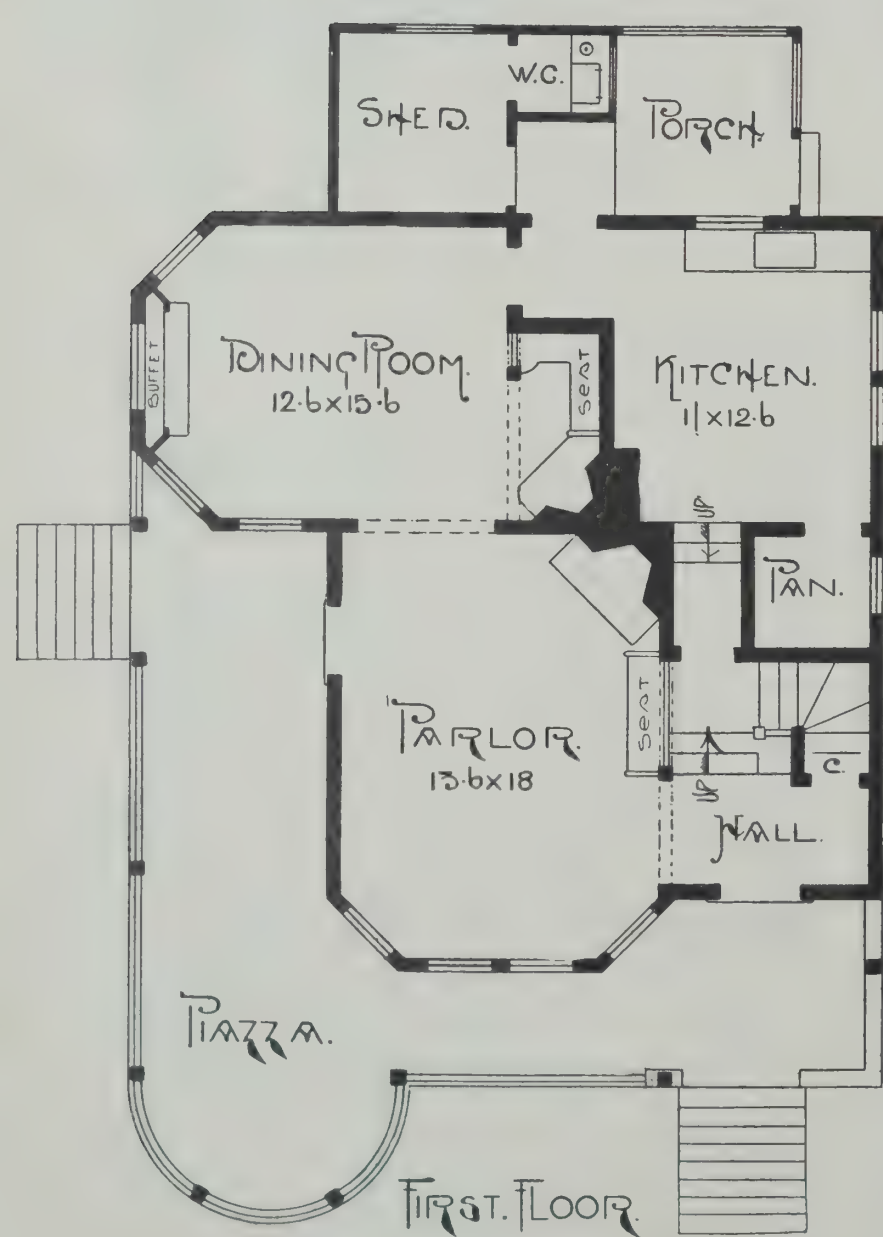




[See page 66.]

A RESIDENCE AT BRIDGEPORT, CONN.





[See page 66.]

A SUMMER COTTAGE AT DIAMOND ISLAND.











A RESIDENCE AT BRIDGEPORT, CONN.



SECOND FLOOR.

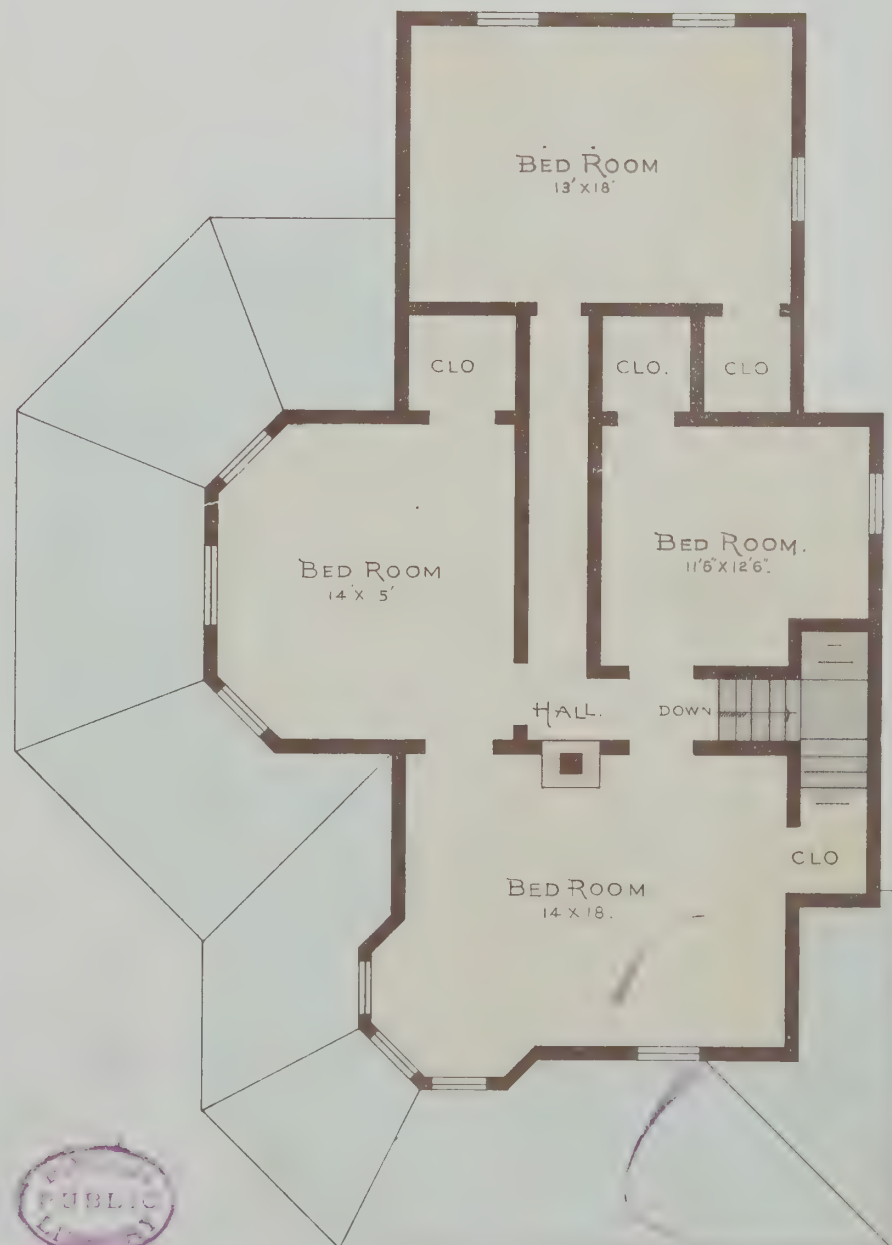




A COTTAGE NEAR PORTLAND, MAINE.



FIRST FLOOR.

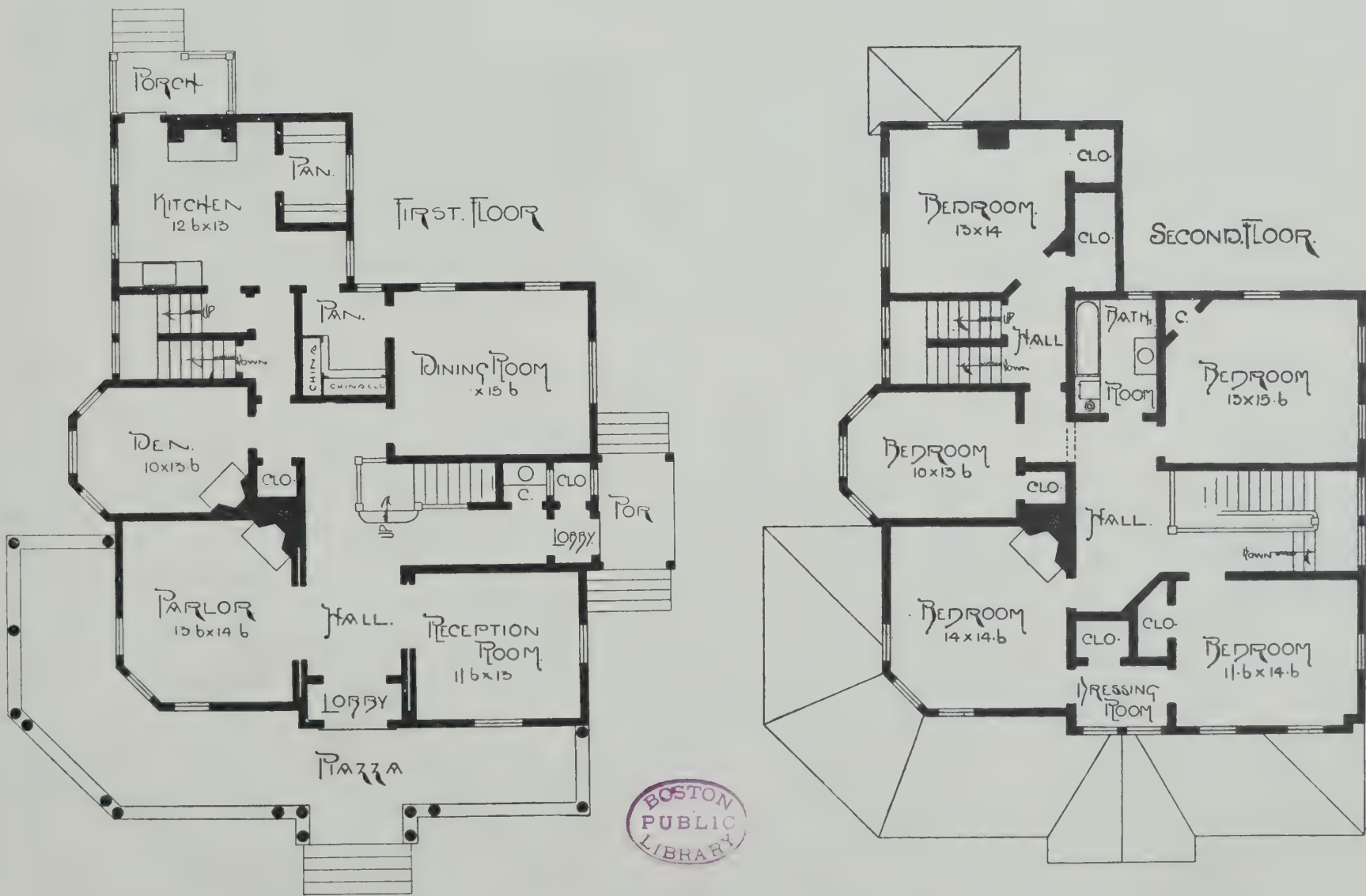


SECOND FLOOR.









[See page 66.]  
A RESIDENCE AT BRIDGEPORT, CONN.



## EXAMPLES OF ENGLISH INTERIOR DECORATIONS AND FURNISHINGS.

## AN ENTRANCE HALL.

At the Crystal Palace Exhibition, London, Messrs. Godfrey Giles & Co. show how it is possible to have a very grand entrance hall for a comparatively low figure. The room fitted up by them as an example is paneled with lincrusta that has exactly the appearance of oak, and is only about a twelfth as costly. The top part of the walls is papered in imitation of tapestry. It is astonishing how well they get up papers to look like materials nowadays. It would be necessary to touch this particular paper to find out that it was not the real thing; the stitches are imitated to perfection. In the doorways are hung crown-shaped electric lamps. I couldn't help noticing that the knights in armor looked as if they had had a fright. Instead of standing up boldly as they should, they stood in the corner leaning limply against the walls. Perhaps they hadn't quite got over the Lord Mayor's visit.

There is also a dining room fitted up by this firm, the decoration of which is handsome even though it isn't what it seems. The walls are paneled with a bluish-gray paper in imitation of stamped velvet, and the novel electric fittings are in repoussé metal and represent the planets. The lamp hanging over the

lights burning in quaint Arabian lanterns. It is a delightfully luxurious room. The walls are dark red, and the window is Musharabeyah carved wood. There are many kinds of Eastern rooms, and it is those that are decorated with Japanese fans and storks that make me sick. A room furnished in true Eastern fashion, such as the one I have described, most people would consider charming.

Frank Giles & Co. show a Gothic hall, a Renaissance dining room, and a Louis XVI. drawing room. The hall is quite the grandest I have ever seen. It is furnished exactly as if it were inhabited, and the oak-paneled walls are shown to splendid advantage by a display of Delft ware on a shelf going all round the room. Two ornamental old sledges from Friesland serve the purpose of fern stands. In the dining room a striking and rather original effect is produced by the introduction of electric lights into the carved recesses of the ceiling. I explained before how old candlesticks and candelabra may be turned to account. They are fitted with imitation candles of china, and the electric light burns at the top in a little glass bulb hidden by a silk shade. This form of lighting I saw in most of the rooms.

People have taste and means not always in proper proportion. Some have means without taste, and some have taste without means. Either situation is unpleasant, but in these days I should prefer taste with comparative poverty, for now a very little money can be made to go a very long way toward satisfying one's

fuse or amalgamate them with the silicates and oxides of iron, will readily dissolve the alkalies on becoming wet, and with the evaporation of the moisture a large quantity is carried to the surface and deposited in crystalline form.

The general effects are seen most in smoky cities, where the atmosphere is charged with saline matters, which during rainy weather are lodged against brick walls, and stored there for continuous chemical action. From time to time their increase goes on, until they become great enough in quantity to be readily discerned by the naked eye.

In cities free from excessive quantities of coal smoke efflorescence or exudation of alkalies on brick and stone walls is rarely seen.

A preventive is said to be the coating of walls with a mixture of one part of linseed oil and three parts of spirits of turpentine. This forms a durable, transparent and glossless varnish, that will prevent the formation of alkaline efflorescence and not destroy the soft and natural color of the brick.

## Household Pests.

Professor Riley, in a lecture before the Lowell Institute, discussed most practically the subject of how to get rid of household pests. For certain of the commoner pests, such as bedbugs, carpet beetles, and clothes moths, benzine applied in a fine spray by means of an atomizer was said to be the best remedy, as it destroys the insect in all stages, including the egg. In the use of benzine great care should be exercised that no fire or artificial light is in the room at the same time, as the vapor of benzine is highly explosive. For cockroaches, bristle bugs, fish moths, and fleas Pyrethrum



AN ENTRANCE HALL.

center of the table represents the sun, and is ornamented with the signs of the Zodiac. I ought to say something about the table decoration. It is rather realistic, and consists of a lake of water and little fountains, bounded by a fence of ferns and flowers, with lights gleaming here and there.

## A CHIPPENDALE DRAWING ROOM.

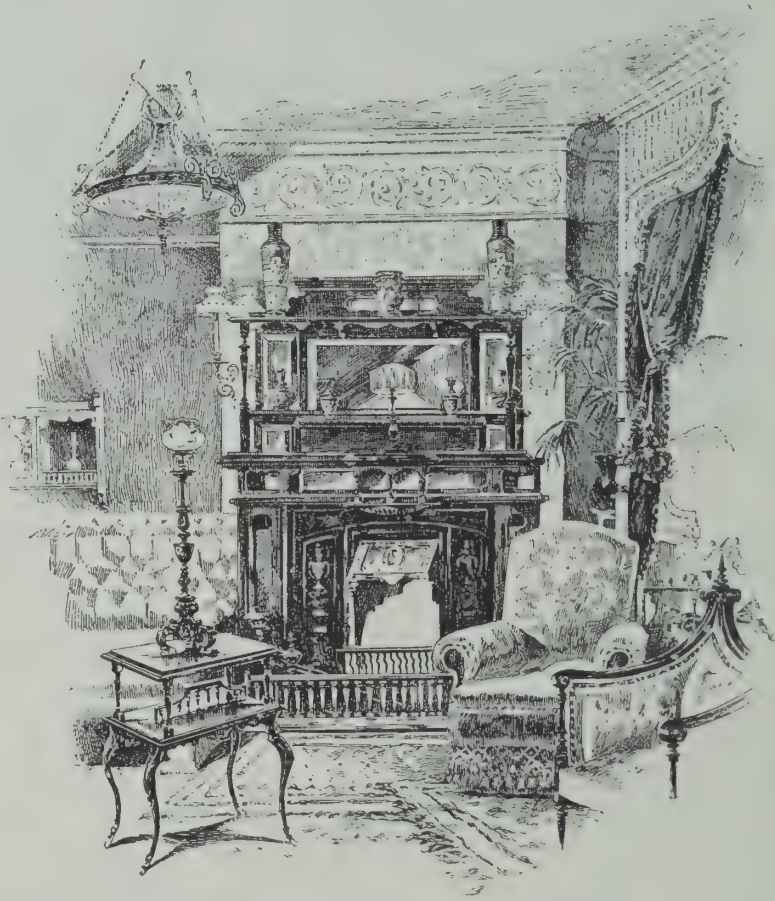
Quite as pleasing, though not half so sumptuous, as some of the rooms I have described is a small Chippendale drawing room with pink walls, furnished by Wallace & Co. (Curtain road). The glamor of the Louis XVI. drawing room distracts one. This little room, with its pretty cabinets and comfortable armchairs, one can feel at rest in. It is just pleasantly luxurious. At one end of it, through a fretwork arch draped with velvet, is a mirror that reaches from the floor to the ceiling—an ingenious arrangement for magnifying the size of the room. As a detail I may mention that the ceiling is covered with flock paper tinted pink. From the middle of it hangs an electric lamp with a silk shade that throws out a soft, warm glow.

The "Princess Christian suite of rooms," fitted up by Cooper in Great Pulteney street, are really very splendid—especially the French bedroom. This is furnished in whitewood, carved and hand painted, and the electric fittings are little carved figures. The window and bed drapery are rose-colored silk. The Moorish room adjoining has a ceiling shaped like a tent, made of printed Eastern stuff, a delightful corner seat, with a canopy put up with spears, and softly diffused colored

artistic instincts. Take stained glass, for example. It lends itself to useful and effective decoration. It will give to a little room a dim, religious light that can be obtained in no other way. It can be made to shut out the gloom of a wretched day and a dismal prospect. I need not detail all the advantages of stained glass, and I need not say that it is costly. But, though the real thing may be beyond one's means, a very good imitation may not. The very best of all the imitations is McCaw, Stephenson & Orr's "Glacier." In the first place it is easily manipulated. Any one with gumption can stick it on. Sampson himself could not take it off, and the effect is so good that real stained glass might justifiably be considered an imitation of Glacier. The designs are done by special artists, and the subjects range from little children at play to saints—children at play, every one knows, are far from saintly. There are scenes from the life of Christ, knights in armor, and remarkably pretty Japanese designs. Besides these there are center pieces and borders innumerable, which afford scope for your own power of artistic arrangement. With the excellences of the designs of the various pieces, and the brilliancy of the colors they display, no one can fail to produce at least a satisfactory result.—*Pall Mall Budget*.

## The White Stain or Efflorescence on Brick.

The formation of efflorescence takes place in the following manner: Brick made from clay, having a high percentage of the sulphates of magnesia, soda or potash in their composition, and not sufficiently fired to



A CHIPPENDALE DRAWING ROOM.

powders were recommended. For the destruction of the mosquito the professor recommended Pyrethrum powder moistened, made into little cones, then allowed to dry, and burned in a closed room. The effect, the professor said, is to stupefy or kill the mosquito. The professor thought that it was a mistaken idea, held by many, that mosquito bites sometimes inoculated the body with malarial poison. He said that the idea came from the fact that mosquitoes and malaria flourished usually under the same conditions.—*The Christian Union*.

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## DESIGN FOR A STAIR HALL.

We present herewith a very tasteful design for a stair hall, for which we are indebted to the *Architectural Era*. It is from the pencil of Mr. C. F. Schweinfurth, architect, of Cleveland, Ohio, and is from a residence by him designed in that city.

## COUNTRY RESIDENCES NEAR NEW YORK CITY.

On page 72 we give several photographic plates of handsome residences near New York, for which we are indebted to Dr. J. J. Higgins, of No. 23 Beekman Place, this city. In addition to his rare accomplishments as a physician and surgeon, the doctor is an amateur photographer of rare skill, and his recreations in this direction have resulted in many most beautiful and artistic productions. Referring to page 72, it is to be noted that numbers 212 and 270 represent the same house, one picture being taken before the alteration, the other after the addition of piazzas etc.

## A SUBURBAN DWELLING.

Our engraving, page 73, which was made direct from a photograph of the building, taken specially for the *SCIENTIFIC AMERICAN*, presents a suburban dwelling,

pitched and held to the keynote of the room. To find the keynote, sing the natural scale slowly, evenly, and smoothly, or play this scale on piano or organ. The note which is most prominent is the keynote.

## ST. ANDREW'S EPISCOPAL CHURCH, NEW YORK.

We present on page 75 a perspective view and ground plan of St. Andrew's Episcopal Church, which has been recently erected through the untiring efforts of its rector, the Rev. George R. Van de Water, on Fifth Avenue and One Hundred and Twenty-seventh Street, Harlem, New York. The building is in the Gothic style, and it has a frontage of 100 ft. on Fifth Avenue and a depth of 160 ft. It is built of rock-faced Connecticut gray stone, with dressed trimmings. Cluster columns, with ornamental caps, flank the front entrance, which is fitted with broad massive doors of quartered oak. The other entrances have similar doors. The building is made impressive by a tower and a steep-pitched roof, covered with octagonal cut slate. The tower contains a four-dial clock and a chime of bells. The altar table is built of Caen stone and the altar on either side is wainscoted with richly colored marble. The picture representing St. Andrew is placed above

## Curious Foundations.

The *Railway Review* tells of a novel method of laying foundations in swampy soil recently employed by an American engineer. The building to be supported was a low wooden one which it was proposed to use for the storage of machinery. Casks were set in holes in the ground along the line of posts and were filled to the depth of about one foot with iron turnings. The posts were placed in the casks, which were then filled with iron turnings compactly rammed in place. A solution of salt and water was slowly poured over the turnings, under the action of which they solidified into a hard mass. The heat of the oxidation of the iron was so great that the posts were charred. This also served to act as a preservative, and to that extent the iron turnings are probably superior to concrete under similar conditions.

## An Albany House.

On Washington Avenue, Albany, stands a large house of modern architecture, the new residence of W. M. Whitney, of the firm of W. M. Whitney & Co. The drawing room to the left is a marvel of excellent taste and exquisite coloring, with its carved wood work



STAIR HALL, RESIDENCE IN CLEVELAND, OHIO.—C. F. SCHWEINFURTH, ARCHITECT, CLEVELAND, OHIO.—From the *Architectural Era*.

erected for Mrs. F. C. Treadwell, at Bensonhurst, Long Island. Dimensions: Front, 39 ft. 6 in.; side, 48 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. 6 in. The tower and piazza are the principal features. The underpinning is built of brick. First story clapboarded, and second story shingled, painted light olive green, with bottle-green trimmings. Roof slated. Hall and dining room are trimmed with oak, parlor and library with cherry. The floors are laid with oak. Hall contains an ornamental staircase, with closet under same. Fireplaces, where shown, have tiled hearths and facings, and hard wood mantels. Dining room has a bay window, nook for buffet, and china closet. Butler's pantry is provided with drawers, dresser and bowl, complete. Kitchen is wainscoted and provided with range, sink, dresser, larder, shed, etc. There are four bed rooms, large closets and bath room on second floor, and four bed rooms on third floor, all replete. Cemented cellar under whole of house, contains laundry, furnace, and other apartments. Cost \$5,800 complete. Mr. Walter E. Parfitt, architect, Brooklyn, New York.

## The Keynote of an Auditorium.

In rooms of poor hearing qualities Dr. Ephraim Cutter says: Every hall or church has its keynote, and the audience will hear better if the speaker's voice is

the altar, in a peculiarly good light. The effect is obtained from a glass skylight in roof. It is acknowledged that no such beautiful picture can be found in any other church in this country. The choir stalls are well located. A brass pulpit is placed at the northeast corner of chancel. The font and organ are at the left and the north transept contains an altar table for use on week days. The rector's study and the clergy and choir vestry are placed conveniently, and are fitted up with all the necessary furnishings. The parish office is located at the Fifth Avenue entrance, and it is provided with a large open fireplace. The woodwork and furnishings throughout are of quartered oak and highly polished. There is a most convenient and well lighted basement extending the whole length and breadth of the church, which affords ample space for Sunday school room, class rooms, ladies' sewing room, vestry and toilets complete, which receive light and ventilation from the areas at side of building. Seating capacity of church, 1,300. Seating capacity of Sunday school room, 1,000. Mr. Henry M. Congdon, architect, Broadway, New York. Messrs. Mahony & Watson, contractors. The church building committee consisted of Messrs. Donald McLean, A. T. Timpson, W. B. Ogden, J. B. Simpson, Jr., O. B. Smith and J. L. Reid.

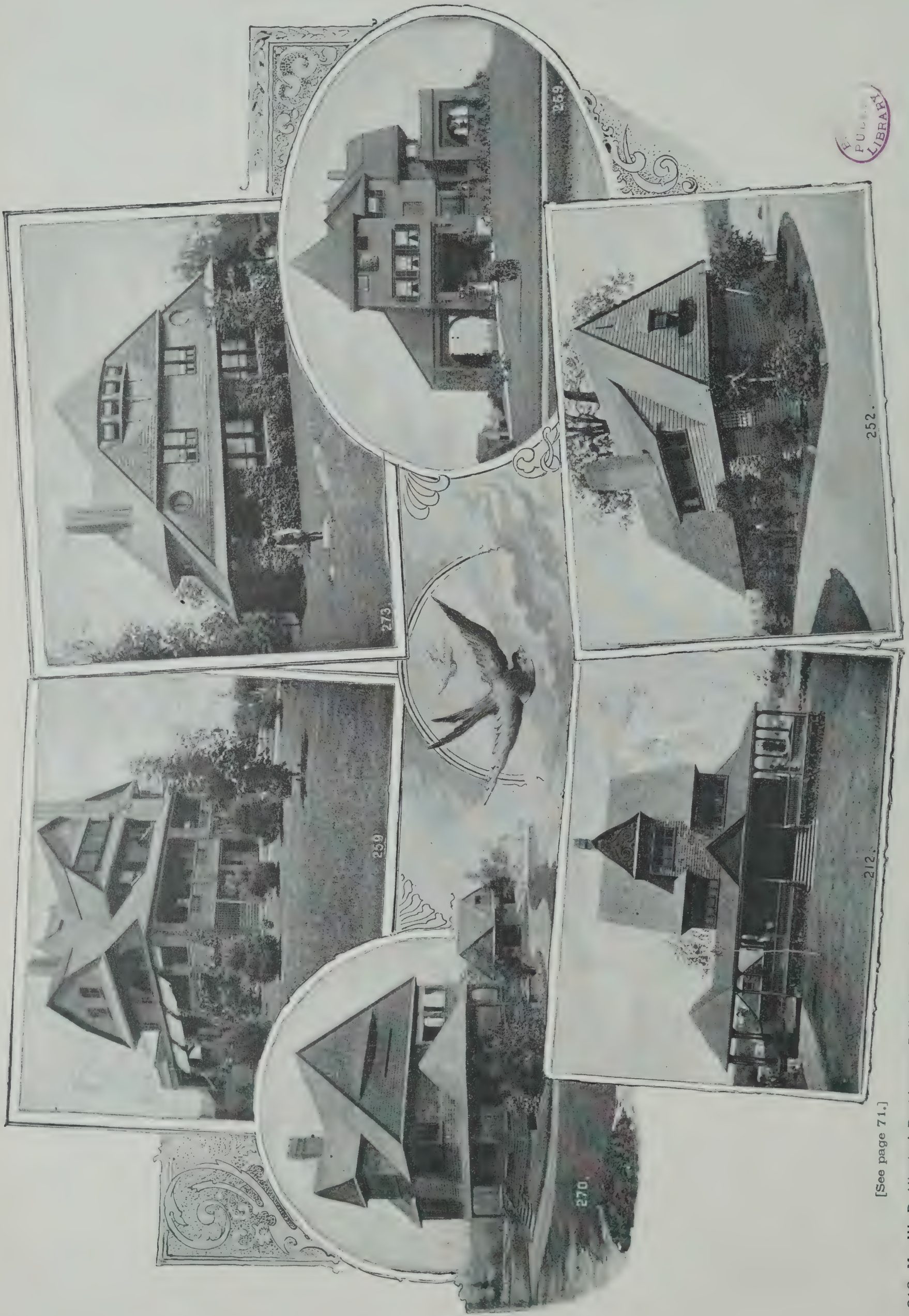
Our engraving was made direct from a photograph of the building taken specially for the *SCIENTIFIC AMERICAN*.

enameled in deep cream, tapestry side walls in gold with Nile green hangings of satin damask and furniture of Louis XIV. style. Across the hall from the drawing room one enters the cosey and richly furnished reception room in blue and gold, these colors being carried out from carpet to ceiling. Entering from either hall or reception room you reach the library, in which the wood work is in mahogany, with moss green and bronze effect carried out in furnishings which are plain but rich and substantial. The dining room is one of the finest in Albany, being finished in fine quartered oak made to represent English pollard oak. The decorations are of a dull green, and the floor inlaid, but nearly covered with a fine India rug. The ceiling is of gold, and the furniture of English pollard oak to match the wood work of the room, which is beautifully carved.—*Carpet Trade Review*.

## Plans and Specifications.

Full plans and specifications complete, ready for the builder, may be obtained at this office, for any of the structures illustrated in this publication. We also prepare plans for buildings of every description, including dwellings, churches, schools, stores, barns, carriage houses, etc. Our work extends to all parts of the country. We are assisted by able architects. Terms moderate. MUNN & Co., 361 Broadway, New York.





[See page 71.]

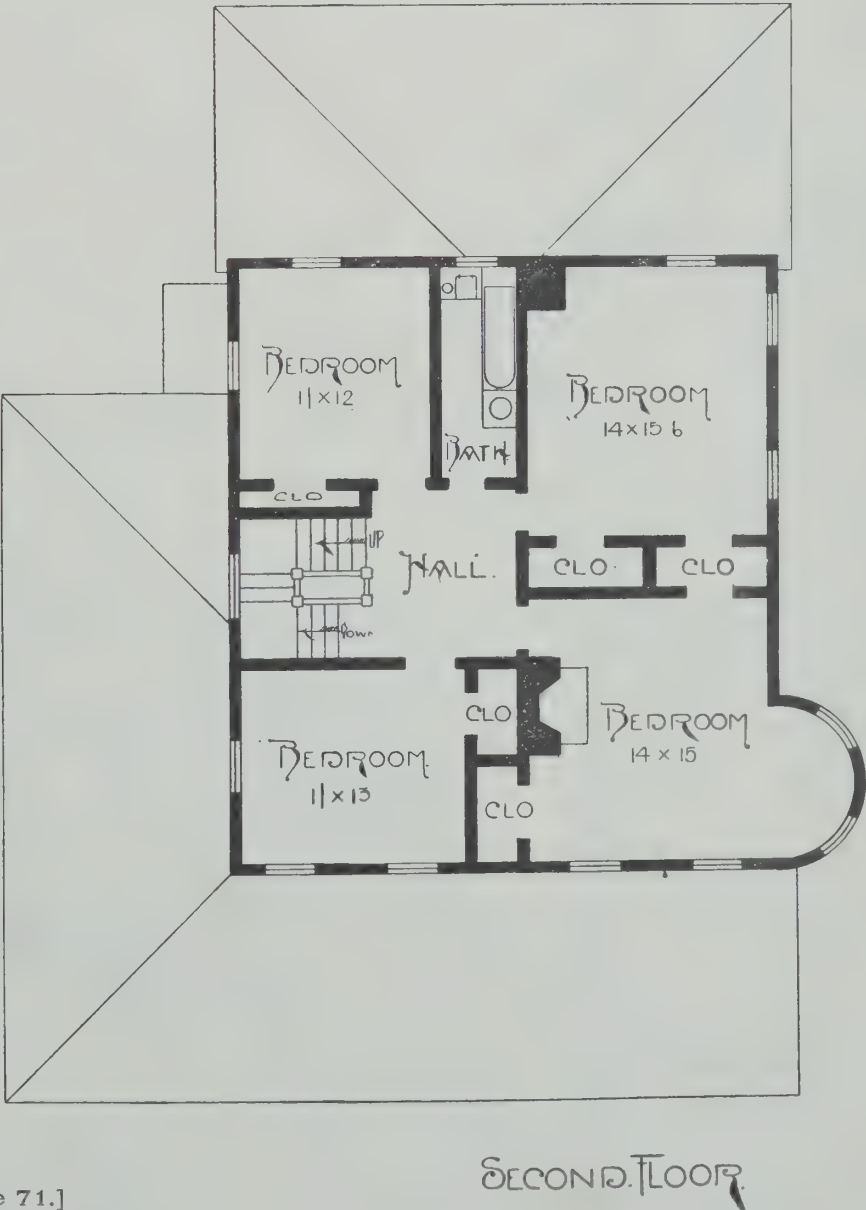
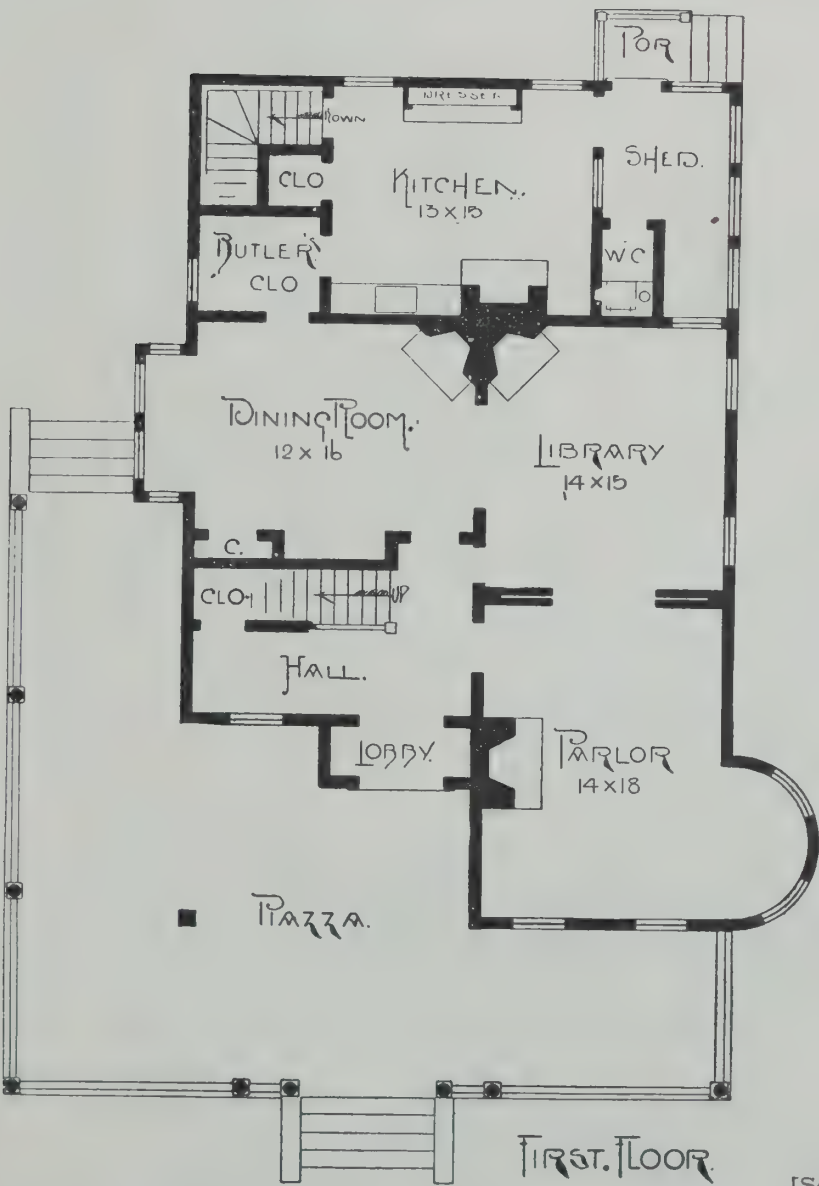
212. Mr. W. B. Higgins' Residence, Belle Haven, Conn.  
 270. " " " [After alteration.]

273. Residence at Greenwich, Conn.  
 252. Club Stable, Belle Haven Park.

259. Residence Belle Haven, Conn.  
 269. Mr. Wetherill's Residence, Belle Haven Park.







[See page 71.]  
A SUBURBAN DWELLING.



## A HOUSE FOR \$1,100.

Herewith we give a sketch and plans of a convenient and economical house, just the thing for a small family. Our engraving is from the *Builder's Gazette*.

## To Keep Iron Pipes from Rusting.

A simple and economical way of tarring sheet iron pipes, to keep them from rusting, is as follows: The sections as made should be coated with a coal tar and then filled with light wood shavings, and the latter set on fire. It is declared that the effect of this treatment will be to render the iron practically proof against rust for an indefinite period, rendering future painting unnecessary. In proof of this assertion, the writer cites the example of a chimney of sheet iron erected in 1866, and which, through being treated as he describes, is as bright and sound to-day as when erected, though it has never had a brushful of paint applied to it since. It is suggested that by strongly heating the iron after the tar is laid on the outside, the latter is literally burned into the metal, closing the pores and rendering it rust proof in a far more complete manner than if the tar itself was first made hot and applied to cold iron, according to the usual practice. It is important, of course, that the iron should not be made too hot, or kept too hot for too long a time, lest the tar should be burned off. Hence the direction for the use of light shavings instead of any other means of heating.

## A CALIFORNIA RESIDENCE.

The residence with plans given herewith was designed for Mr. H. C. Paets, to be built at Bakersfield, California. The building is of brick, with the exception of the verandas and cornices, which are of wood.

The location has been carefully considered in the arrangement of the plan and method of construction. Bakersfield being within the warm section of the southern part of the State, the brick walls are built hollow, so as to allow a free passage of air. The projecting cornices, and wide verandas, with thorough ventilation contribute to the comfort of the inmates. The general arrangement is shown on the plans. B. McDougall &

lieve, an illegal act in some cities, for it will not only destroy the sewers, but the heat of the steam makes the malarial gases more active, while at the same time it produces a certain amount of pressure that will force the gas back into buildings through the water traps commonly in use. In these traps there is seldom more than three inches of water, and very little pressure is necessary to force the gas through them.

Wherever gas is forced back through buildings in this or a similar manner, the death rate in that locality will certainly be greatly increased.—*The Stationary Engineer*.

## The Senate Chamber New Decorations.

The *Carpet and Upholsterer's Record* reports the way a gushing correspondent describes the new decorations of the Senate Chamber: "A carpet which is a combination of terra cotta, old gold, and crushed strawberry, beautiful to look at and soft under foot, has replaced the garish green affair which covered the floor in the last Congress. The niches above the galleries have been painted a delicate terra cotta to harmonize with the carpet. They now offer a better background to the busts within them. The diplomatic gallery no longer offends the eye with

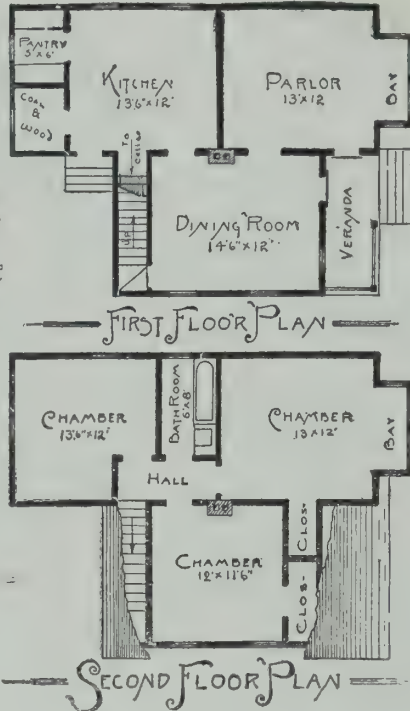
its bright blue upholstery, which has given way to a lining of salmon tint, which is effective. The seats of the other galleries are now finished in gray. The mahogany desks of the Senators contrast handsomely with the carpet and mural adornments."

To prepare transfer paper, take some thin post or tissue paper, rub the surface well with black lead, vermilion, red chalk or any coloring matter. Wipe the preparation well off with a piece of clean rag and the paper will be ready for use.



Smith & Robinson Archts  
Altoona Pa

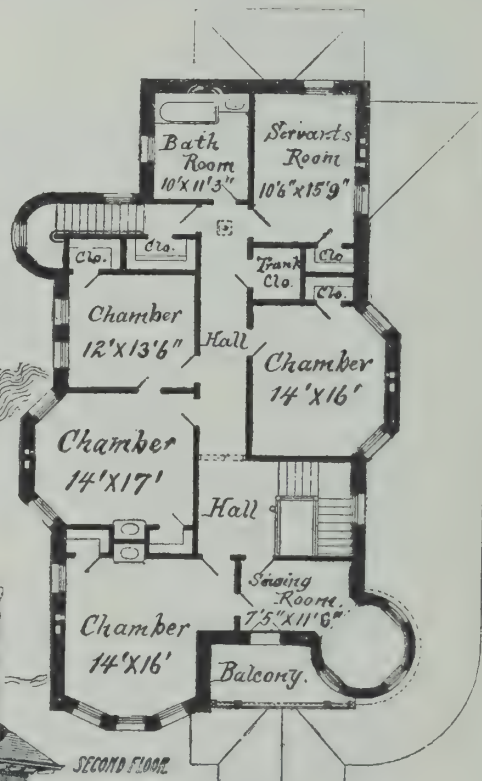
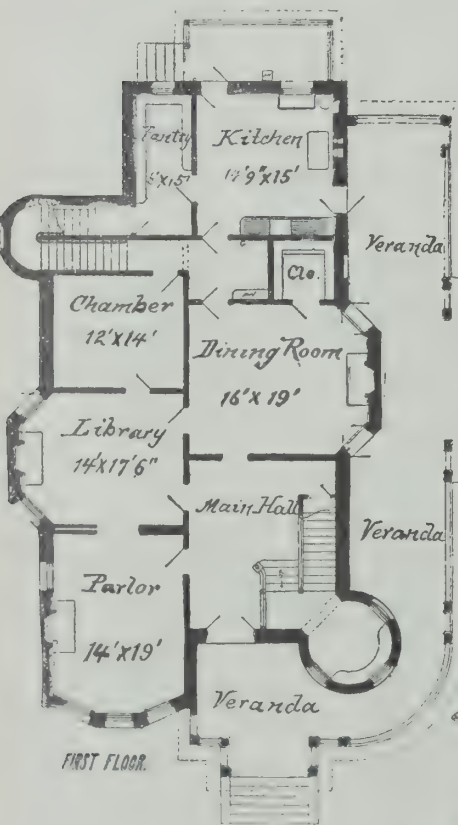
A HOUSE FOR \$1,100.



Son are the architects. For the above and our engraving we are indebted to the *California Architect*.

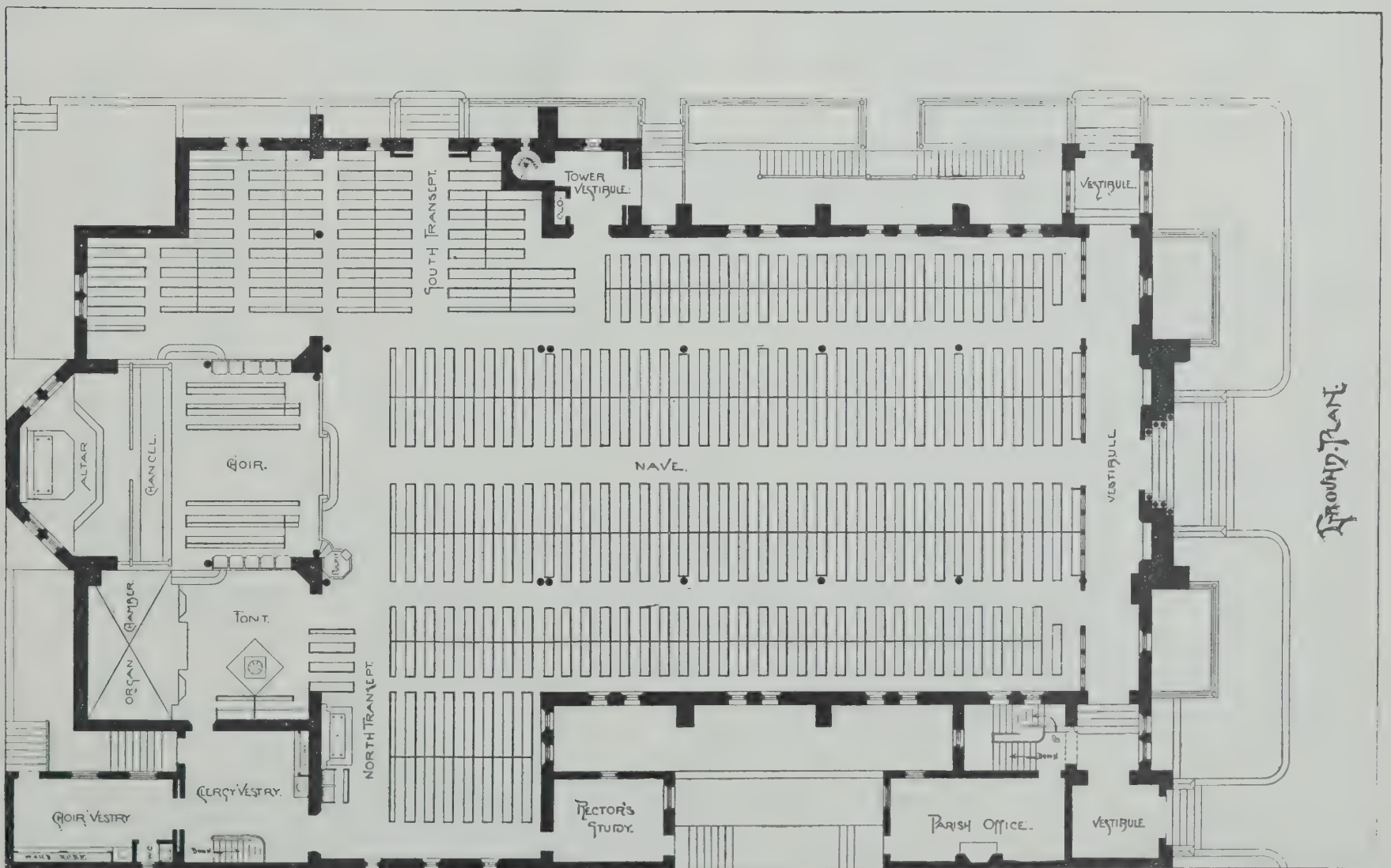
## Don't Turn the Exhaust into the Sewer.

Steam should never be put into a brick or cement sewer, as it has an injurious effect on the same, causing disintegration and collapse within a very short time; neither should it be led into a brick chimney, for the same reasons. In some places it is the practice of engineers to turn the exhaust from pump or small engine into the sewers, but this is bad practice, and, we be-



A CALIFORNIA RESIDENCE.





ST. ANDREWS EPISCOPAL CHURCH, NEW YORK. [See page 71.]



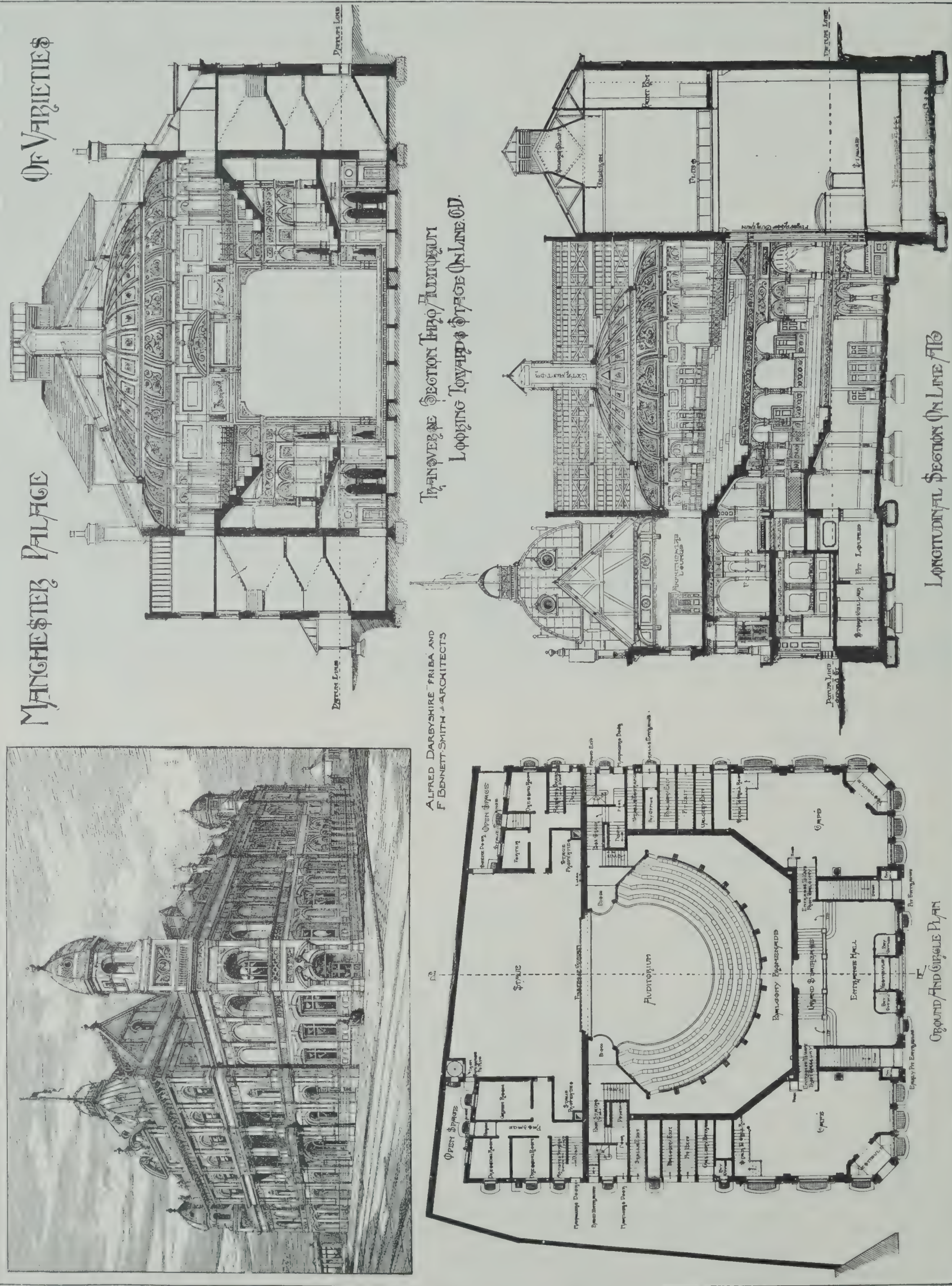
THE MANCHESTER PALACE OF VARIETIES.

We give herewith the perspective and plans of this new building, for which we are indebted to the *Building News*, London. The structure presents suggestions useful to builders who may have occasion to erect works of this kind. This building is located at the

used by the public will be fireproof. The dressing rooms and stage are so arranged that each portion can be detached in case of fire. An interesting feature connected with the building is that access can be had from the main tier to the winter garden and foyer on the first floor, the dimensions of which are 66 ft. by 27 ft.,

Darbyshire, F.R.I.B.A., and F. Bennett Smith, the architects.

If any of our readers have made an invention for which they have thoughts of taking a patent, they are invited to communicate with Messrs. Munn & Co.,



corner of Oxford and Whitworth Streets, Manchester. The theater frontage is 103 ft. 6 in. to Oxford Street and 139 ft. 6 in. to Whitworth Street. The auditorium 90 ft. by 66 ft. and the height from the pit floor to the spring of the dome 60 ft. A novel feature in the planning of the auditorium is that it is placed parallel with the stage and not in prolongation of it. The block of buildings is isolated from the surrounding property. The staircases, corridors, and all portions of the house

and an outside loggia, connected therewith, fronts Oxford Street. It has been so designed that the stage will be viewed from both the foyer and winter garden. The fireproof staircases, circle tiers, doors, partitions, and auditorium and stage ceilings executed by the Titanerete Co., with their patent fireproof materials. The decorations by Messrs. Heighway and Depree, of London. The building erected by Messrs. W. Brown & Son, contractors, from the designs of Messrs. Alfred

the publishers of this paper, who for a period of forty-three years have conducted a most successful bureau in this line. A pamphlet of instructions will be sent free, containing full directions how to obtain a patent, costs, etc. In very many cases, owing to their long experience, they can tell at once whether a patent probably can be obtained; and advice of this kind they are always happy to furnish free of charge. Address Munn & Co., SCIENTIFIC AMERICAN office, New York.



**Floors and their Finish.**

The carpenter is not infrequently called upon to finish or suggest a good method of finishing a floor that is not intended to be covered with carpets or rugs—such, for instance, as that of a lobby, schoolroom or meeting hall. A large number of preparations have been put on the market for this purpose, says an English exchange, but it may be fairly asserted that none of them will last for any considerable length of time, but will need renovating every year or so. Some of the patent floor paints are for this purpose fairly satisfactory. The best method of finishing a floor will, of course, depend upon the kind of wood of which the floor is composed. If it be hard wood or hard pine, and is a new floor, the wood may be filled with a good paste filler and varnished with the special varnish made for floors, and sometimes known as "floor finish" or elastic finish.

When the floor is an old one, or is made of soft pine, a satisfactory finish may be obtained in the following manner: First give a good priming coat of oil and ocher mixed thin, taking care that the ocher is ground fine. Then take one pound fine flour of emery, one pound of litharge ground fine in oil, and three pounds good yellow ocher ground in oil. Mix together with boiled oil and quick rubbing varnish, in the proportions of four of the former to one of the latter, until of the consistency of paste. Thin with turpentine and apply two or three coats. It is important that no more be applied than is absolutely necessary. A coat of floor varnish may be added if desired. The above method of floor finishing is especially recommended for the floors of kitchens, schools, etc.

**WAXING FLOORS.**

Wax finishing of floors is, in the experience of many, the most durable and satisfactory of all floor finishes. The advantage it possesses is that wear and tear only serve to make it, within certain limits, better—that is, if it is properly looked after. When an old floor is to be waxed it should be thoroughly scoured with scouring soap, ammonia being freely used where necessary.

When dry, apply a coat of shellac. Rub down thoroughly with fine sandpaper and oil; then apply the wax and polish. This method is particularly well adapted when it is desired to finish a floor quickly. The wax may be purchased ready for use, but may readily be prepared by heating white wax and adding turpentine until of the consistency of a paste. To keep waxed floors in good condition they should be frequently rubbed up, and it is desirable, therefore, to leave a little of the wax with the occupants of the house, with directions to occasionally renovate the work. It may appear at first sight that this would be an unbusiness-like proceeding, as it would destroy the chance of the tradesman being called in to touch up the floor himself. It should be remembered, however, that when the floor is kept in a good condition for a long time in this way a valuable reputation for good work is obtained, which will probably bring in far more than any possible loss by reason of the occupant "doing it himself."

When old floors become spotted they may be made to look "as good as ever" by applying a solution of ammonia and water, half and half, thoroughly washing off and polishing with wax. A method of finishing floors which possesses the advantage at least of durability is as follows: Take boiled linseed oil, heat it to boiling point, and immediately pour it over the floor, distributing it and rubbing it around with an old stubby brush. Take care that the room is dry and free from dust. After say five or six hours, rub off with old rags or sacking all the oil that has not dried in. A floor prepared in this way will look well for a long time.—*Carpentry and Building.*

**Bedroom Furnishing.**

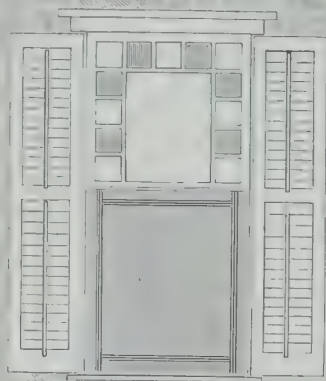
In no apartment in the house, says *Furniture and Decoration*, is such simple taste so welcomed and appropriate as in the bedroom. Here there should ever be an air of quiet and repose and a complete absence of all obtrusive decorations and assertive colors. An air of subdued harmony should invest the entire apartment; and walls, ceiling, floor coverings, wood work and hangings should all be selected so as to unite all together and form a peaceful *tout ensemble*.

Various schemes of decoration of course permit of the employment of a variety of woods for furniture of the bedroom. Where delicate olive greens or subdued blues prevail upon the walls, etc., it is well to employ dark cherry colored mahogany or rosewood. Where rose color or warm yellow or salmon is preferred, then the introduction of an ivory white enameled suite would be most desirable, and so on in like manner with the rest of the furni-

ture woods it is absolutely necessary to maintain a sympathetic coloring on the walls, etc., if a restful and tasteful effect is to be accomplished. The repetition of this truism may, perhaps, seem superfluous to some of our readers, but it is astonishing how frequently it is violated.

**MODERATE PRICE SCREENS.**

Fly screens for doors and windows have grown to be a modern necessity. With the growing demand for these goods, numerous factories, some of them very extensive, have arisen. The warm weather comfort seeker can obtain from the stores a great variety of

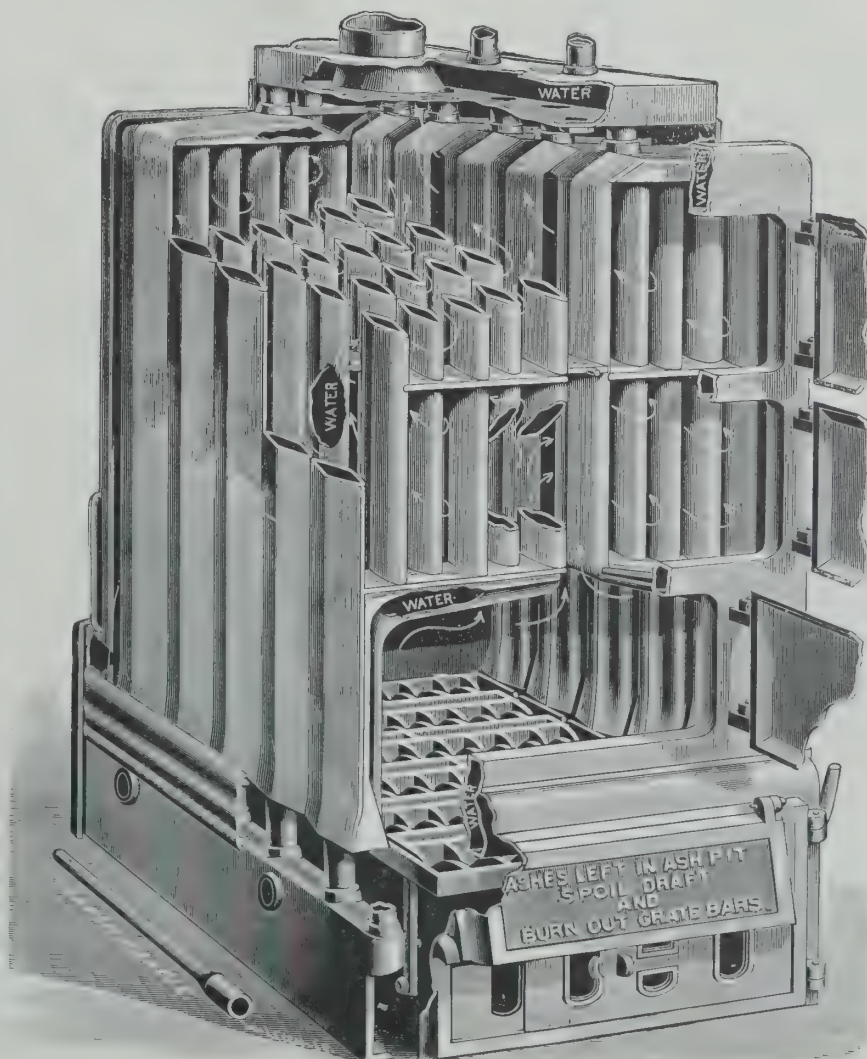
**MODERATE PRICE SCREENS.**

adjustable screens. If he is wealthy, he can get the elegant polished affairs made up to fit his windows. It is obvious that screens made to order are the most desirable, if you can afford them. One of the largest screen door and adjustable window screen factories has recently added a department for making to order, on a large scale, screen doors and windows at moderate prices. The most expensive window screens are usually of polished hardwood and must of necessity be put inside the sash to protect them from the weather. The factory mentioned (A. J. Phillips & Co., Fenton, Mich.) contend that for utility and comfort, a screen should be outside the sash; it is then out of the way of curtains and inside blinds and does not interfere with raising or lowering the sash.

Outside screens require no higher finish than to correspond with the outside of the house, hence should be cheaper. Messrs. Phillips & Co. claim to have a very neat, handsome screen with special machinery and equipment for making it rapidly and well at very reasonable prices.

**AN IMPROVED HOT WATER HEATER.**

We show herewith broken-out view of the new Capitol Hot Water Heater, whose manufacturers claim for it that it is not only the handsomest heater made and the one that takes up the least room, but that it is the one that heats water the hottest and quickest and

**THE "CAPITOL" HOT WATER HEATER.**

keeps it hot with the least fuel. They state that all who have seen the Capitol like it at once. It is shipped in sections, easy to handle, and quickly set up. It has few water joints, and they are screwed together, all metal, and all practically outside the heater, away from the action of the fire and accessible for any necessary tightening without disturbing the fire, or even opening a door. A broken section can be shut off and the heater run without it until a new section can be put in. The change can be made without disturbing the rest of the heater or the piping. The Capitol is also exceptionally well planned for ease of cleaning and management. It is made by the Capitol Heater Company, Detroit, Mich., who will give full particulars on application.

**The Compensation of Architects.**

Perhaps the most curious of all modern business arrangements is the bargain now in vogue between the architect and his client. The financial interests of the architect and his client are diametrically opposed. In the case of an ordinary business trustee, it is customary to pay him a commission upon the income he is able to turn over to his client from moneys invested, so that the greater the client's benefit financially, the greater is the trustee's benefit also. The trustee's diligence and care have their reward in an increased commission. In the architect's case the reverse is true. The better he serves his client, the more his commission is reduced. Suppose by diligent labor and study he discovers a mode of reducing the cost of the building some five thousand dollars, by making certain considerable changes in his drawings. By this added labor he saves the owner this sum plus five per cent. commission upon it, or five thousand two hundred and fifty dollars. In recompense of this display of diligence and faithfulness to his client, the latter deducts from the architect's payment two hundred and fifty dollars on the commission saved. But the cost to the architect is further increased by the cost of changing his drawings, the time consumed in studying these changes, and the normal profit that such labor should receive; so that, to save the owner some thousands of dollars, he has to reduce his own profits by an equal number of hundreds. It is obvious that an arrangement having such results sets a premium upon hasty and unscrupulous work, and it is strange that the careful business men of our country should not have already discovered a remedy for a situation so anomalous from a business point of view.—*The Architectural Review.*

**French Observations on American Constructions.**

A French engineer, M. P. Germain, who has recently made a tour in the United States, writes to *Le Genie Civil* some observations on the great American fire-proof buildings. To use his own words, "These buildings fulfill a new requirement, which the American architects have met boldly and frankly, and, in many cases, they have carried out their programme in the happiest manner. These constructions have a great variety of aspect; many present defects of taste, but among the number are some extremely beautiful ones, the production of true artists. I am convinced that we are now witnessing the birth of a new style, which will characterize its age as our cathedrals and castles characterized the Gothic epoch. One cannot too earnestly advise architects and engineers to pay the closest attention to what is now going on in the United States." Like most foreigners, M. Germain finds himself much impressed by the ingenuity with which services of electricity, gas, hot and cold water, steam, and even refrigerating currents, are applied throughout our great buildings; but he finds our methods of construction the most interesting subjects of study, and particularly describes, as worthy of imitation in France, our common system of fireproofing iron columns and beams.—*Am. Architect.*

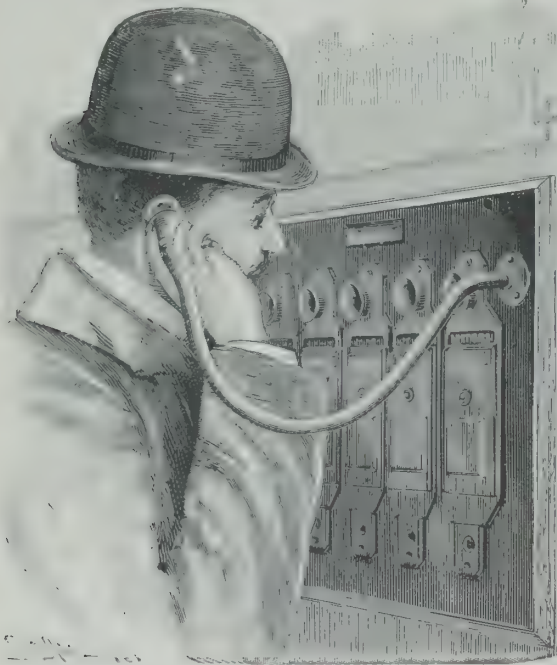
THE CANTON STEEL ROOFING CO., of Canton, Ohio, have issued their sixteenth annual catalogue and reference book. This company make the H. W. Smith folded lock seam steel roofing, and all styles of sheet metal roofing, siding and ceiling, sheathing papers, roof paints, etc. Also the Wock patent slip joint eaves trough, all styles conductor pipe, hangers, cut-offs, strainers, crestings, finials, etc.

WE are informed that a very large aluminum bronze casting has recently been made by William C. Maloney, of Pittsburgh, for a sugar refinery in South America, the casting weighing 3,243 lb. It is understood that this is the largest single piece of aluminum bronze ever made.



## A SPEAKING TUBE AND EARIPHONE.

The accompanying illustrations represent the practical working of an extremely simple improvement in

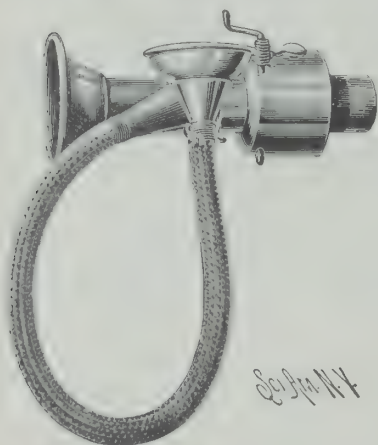


SCHLUCHTNER'S SPEAKING TUBE—USE IN A VESTIBULE.

speaking tubes, the mouth piece being provided with an attached ear piece, whereby messages may be more conveniently received and transmitted. This improvement has been patented by Mr. Frederick Schluchtn

ner, of No. 2661 Atlantic Avenue, Brooklyn, N. Y.

One of the pictures shows the improvement in use in the hallway or vestibule of a house, another representing its employment in a factory, where the different floors are thus held in communication with the office. The mouth piece may be of the usual form, but the tube in front of the whistle has an

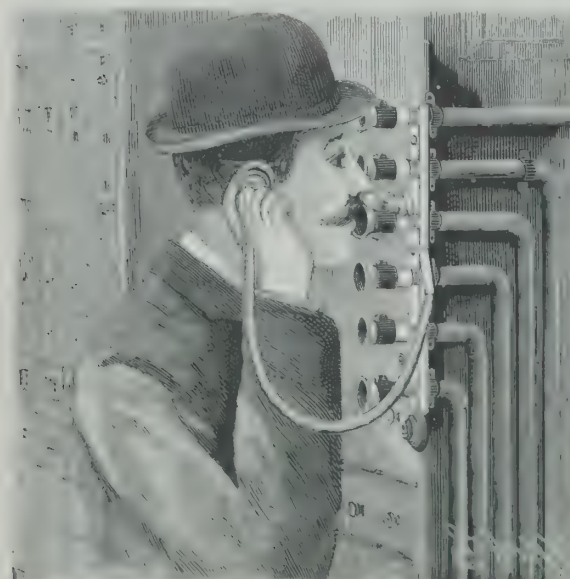


DETAILS OF SPEAKING TUBE.

opening at one side, surrounded by a tube leading into an attached flexible tube, at the end of which is an ear cup. The branch tube leading from the side opening, in front of the mouth piece, leads backward at a slight angle from the main tube, and the branch tube is also made tapering, the flexible tube being secured to its smaller end. When a person blows into the speaking tube, the air exerts its full force upon the whistle in the usual way, not being diverted into the branch tube. In like manner, in speaking into the tube, the voice is projected forward in the usual way; but one can likewise hear the return message without change of position, the voice in this case being diverted into the branch tube,



SCHLUCHTNER'S SPEAKING TUBE.



SCHLUCHTNER'S SPEAKING TUBE—USE IN A MANUFACTORY.

and thence through the flexible tube to the ear cup, so that a conversation may be carried on without constantly changing the end of the tube from the mouth to the ear, and *vice versa*. A fork supports the ear cup when the mouth piece is not in use. This improvement can be readily applied or attached to any existing system of speaking tubes.

This invention has also been patented in Canada, England, France, Belgium, Germany, Austria, Italy, Switzerland, and Spain.

## Diamond Wall Finish.

The last decade has witnessed great improvements and great changes in our methods of building. A material that is entirely new and highly important is the Diamond Wall Finish, manufactured by the Diamond Wall Finish Co., of Grand Rapids, Mich. Its popularity and large sales are due to the merit of the goods, for they quite revolutionize the old methods of finishing walls and ceilings giving, in place of the temporary whitewashes and whitening and glue kalsomines, a natural and lasting finish, made from a base in itself a cement, not dependent on glue to hold it on the wall. Diamond Wall Finish admits of successive recoating, when originally applied to a clean surface, for any length of time and without having to wash and scrape off former coats before recoating. The goods are largely used by the best decorating firms in the country, and work equally well and are economical on a plain job of wall tinting. The goods are adapted to be used in factories, warehouses, etc., as they are whiter than paint, will not discolor and are absolutely fireproof. Parties contemplating building should at all events investigate for themselves.

## Fireproofing Receipts.

Prizes were awarded for the following finishing processes for fireproofing, respectively diminishing the combustibility of tissues, curtain materials, and theatrical scenery. For light tissues, 16 pounds ammonium sulphate, 5 pounds ammonium carbonate, 4 pounds borax, 6 pounds boric acid, 4 pounds starch, or 1 pound dextrine, or 1 pound gelatine, and 25 gallons water mixed together, heated to 86° F., and the material impregnated with the mixture, and then calendered as usual. One quart of the mixture, costing about threepence or fourpence, is enough to impregnate 15 yards of material. For curtain materials, theatrical decorations, wood, furniture, 30 pounds ammonium chloride are mixed with so much floated cnalk as to give the mass consistency; it is then heated from 125 to 140° F., and the material given one or two coats of it by means of a brush. A pound of it is sufficient to cover five square yards.

## AN IMPROVED HOT WATER HEATER.

The hot water heater shown in the cuts is made by the J. F. Pease Furnace Co., of Syracuse, N. Y., and the company claims for it a most substantial and thorough construction. While the heater is comparatively a new one, its strongest feature, the boiler or fire surfaces, has had a satisfactory time test in the combination water and air heaters made by the same company. It is claimed that the heater is constructed with reference to a consistency between fire and grate surfaces and in such a manner as to make every square foot of fire surface effective. The water circulation is positive and continuous. A corresponding circulation of both water and combustion products is established through and over the water-heating sections. The sinuous course of the water circulation is of the same character as that of the combustion products.

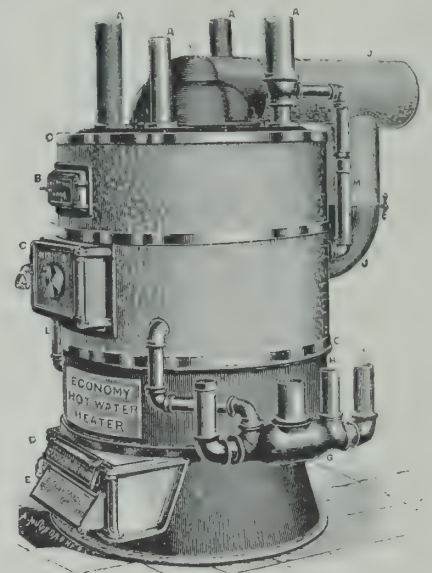
A reference to the transverse view will show an unobstructed water course which is formed over the fire a number of times at its highest temperature. At no point can the water entering the fire pot find exit at the flow pipes without repeatedly passing over the fire and its products. The fire surfaces are so arranged and presented to the fire that every square foot must be touched by the fire travel before the smoke flue is reached.

In addition to the fire surface thus obtained, the hollow fire pot, it is claimed, is made an especially effective fire surface by special construction in the grate, which permits a fluent draught around the sides of the pot, and thus stimulates a strong combustion at the sides of the pot. Facility for dislodgment of ashes around the sides of the pot prevents accumulations which otherwise would impair the efficiency of the pot for practical heating surface.

The two water sides, each extending from feed door to direct draught pipe, prevent external waste of heat in cellar and provide a supplementary circulation of water. The lower part of each one is connected to the return head by pipe, L, and the upper part to flow outlet by pipe, M.

A peculiar advantage over ordinary sectional water heaters is claimed in the erection of the

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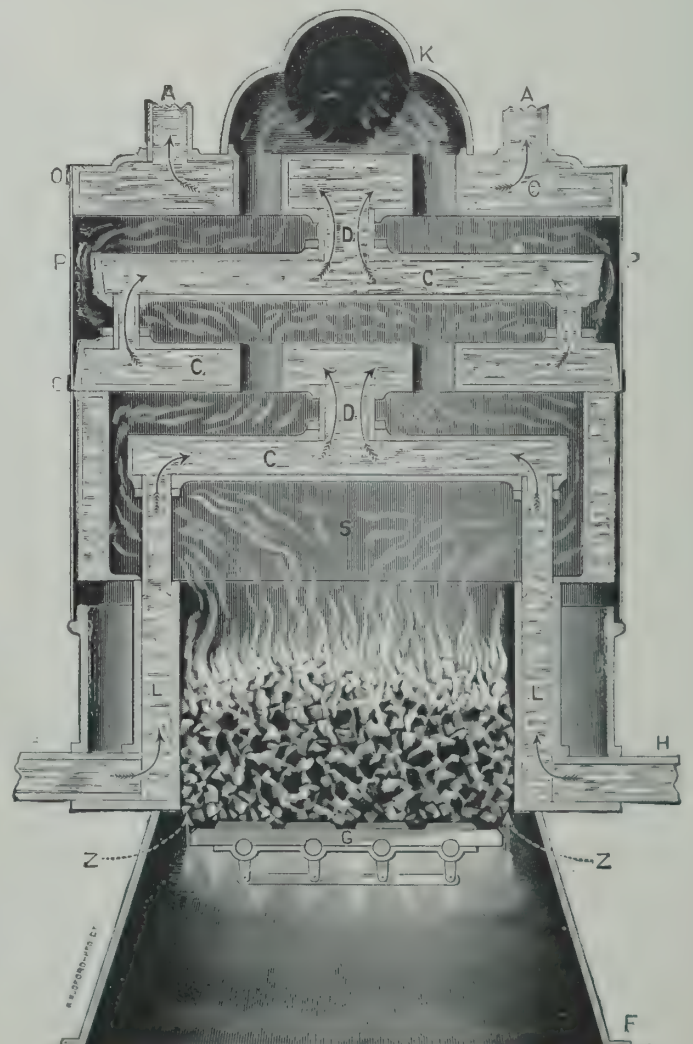
THE ECONOMY HOT WATER HEATER.

rior connection to make—the large nipple connection between the first and second sections, C, C.

Further particulars concerning this heater can be obtained from the J. F. Pease Furnace Co., Syracuse, N. Y.

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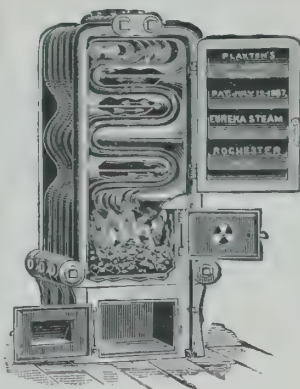
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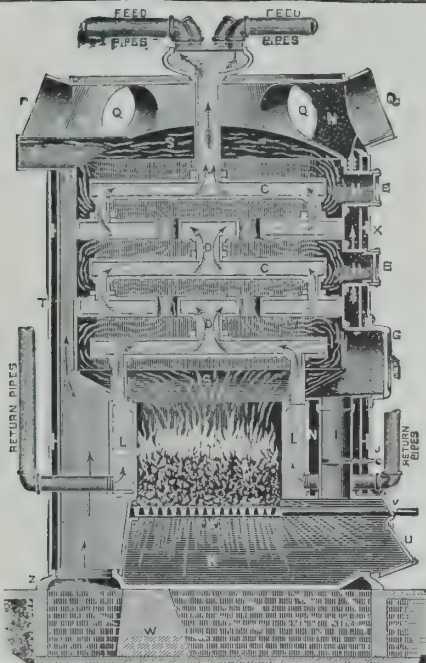
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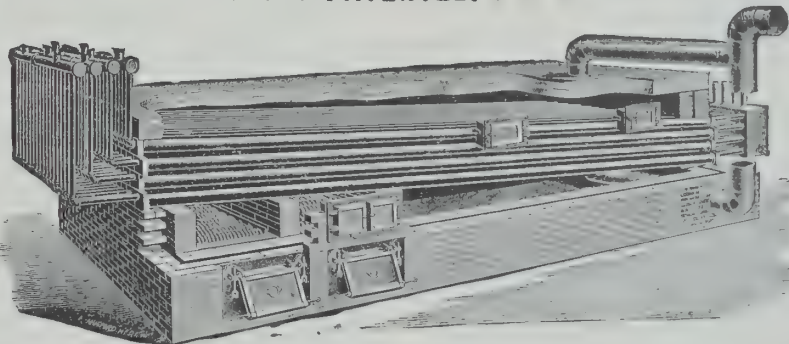
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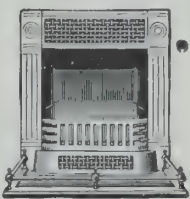


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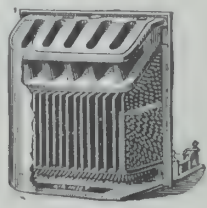
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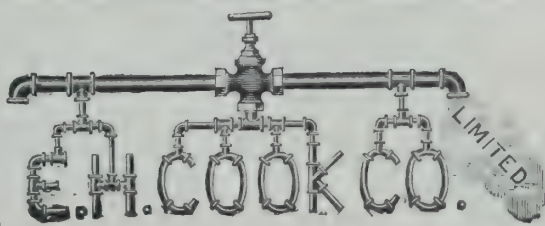
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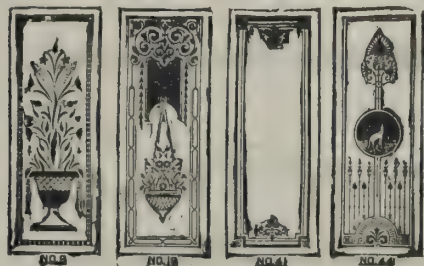
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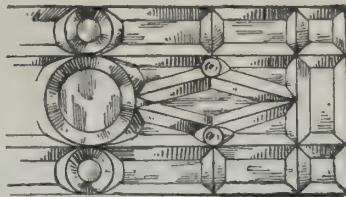
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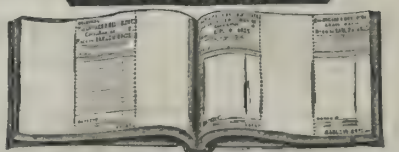
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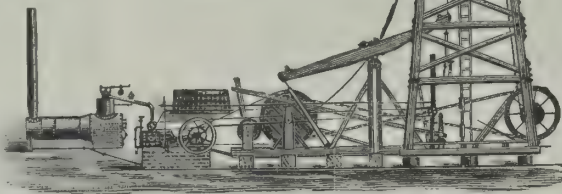
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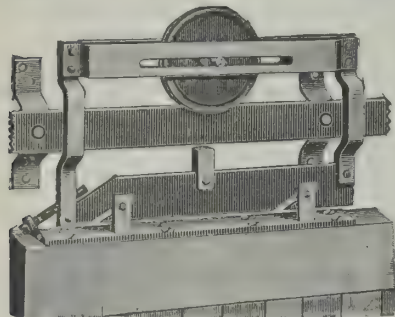
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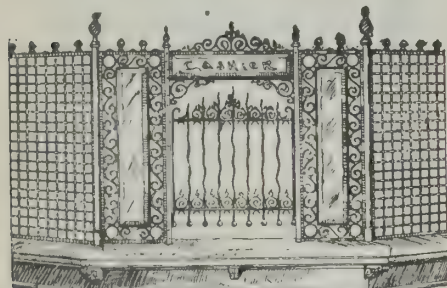
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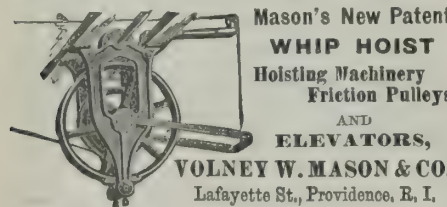


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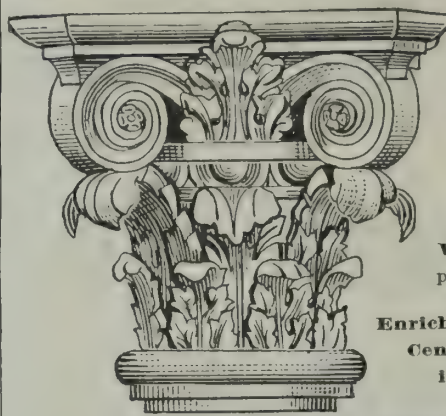
(1) E. W. H. says: I have a long fence with  $4\frac{1}{2}$  inches by  $4\frac{1}{2}$  inches Oregon fir posts set 3 feet in the ground. Fence has only been in position one year, yet the portion of the posts in the ground shows considerable rot on the surface when dug down on. The posts were green when set. I do not want to take up the post, yet, at present rate, it would appear that they would rot off in three or four years. Would it do any good to bore into the posts, just above the ground, in a standing direction, and fill the holes with some mineral salt? If so, how large should the holes be and what should they be charged with? A. We do not know that the plan proposed will preserve the posts, but will no doubt add several years to their life. Soaking the ends of posts in a strong solution of sulphate of iron or sulphate of copper for a day has been tried and found efficient for several times the life of posts without any application of preservative. We think it will pay to bore a  $\frac{5}{8}$  hole in as slanting a position as convenient, from 4 inches above ground, say at  $45^\circ$ , three-fourths through the post, and fill it with a saturated solution of sulphate of iron. In a few weeks again fill the hole and plug with wood or a cork.

(2) J. M. writes: I desire to learn of some absorbent that can be used in connection with the storage of certain perishable products, such as eggs. I want to find something that will absorb gases and odors, without giving off any odor itself. You are aware, no doubt, that in machine storage, it seems necessary to keep rooms tight, and consequently any gases given off are confined in the rooms. It is this I want to get rid of, as it seems to affect the articles of the more delicate kind of perishable merchandise. A. We would suggest the use of a strong solution of potassium permanganate exposed in shallow vessels. Bone charcoal would also have a good effect.

(3) W. A. H. writes: 1. I have a glazed earthenware vessel, the right size for a porous cup, but know of no way to take off the enamel. Could you suggest one? A. The glaze cannot be removed. Better purchase your porous cells. They cost very little. 2. I have a single fluid four cell battery, each cell consisting of a number of electric light carbons with a leaden ring cast around one end and a rod of zinc, well amalgamated, in the middle; inside is solution of salt and water. After being worked through a door bell a few days the current diminishes, but the difficulty is removed by cleaning the zincs. Even then the current does not exceed two and one-half volts. A film seems to come over the zincs. Could you tell me of any way to get more current without so much trouble? Have tried sal-ammoniac, but the current does not increase. Is the zinc surface too small? A. Convert your battery into a Fuller battery by placing the zinc in a porous cell having mercury in the bottom, into which the zinc dips. Place bichromate solution out-

(Continued on page vi.)

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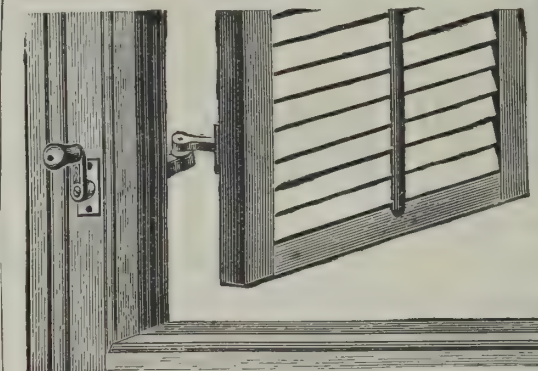
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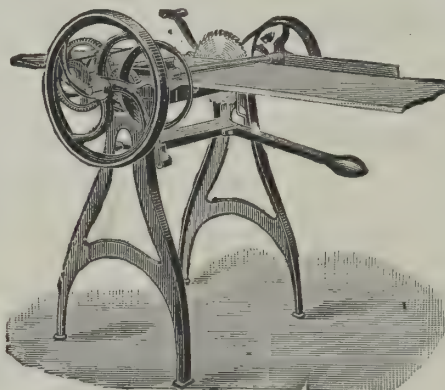
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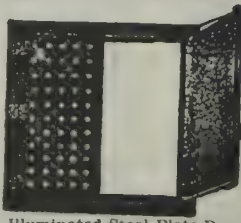
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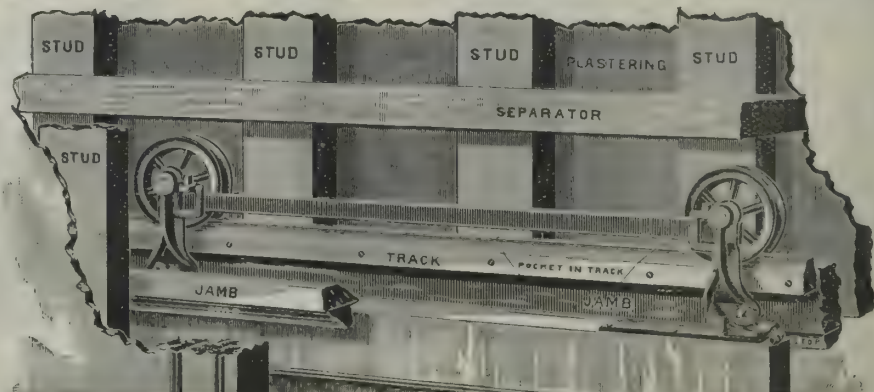
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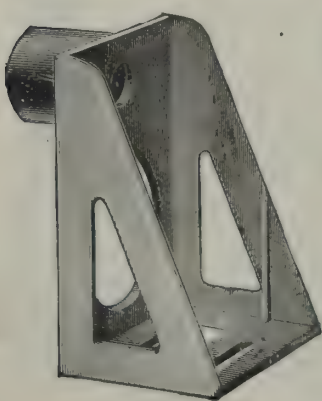
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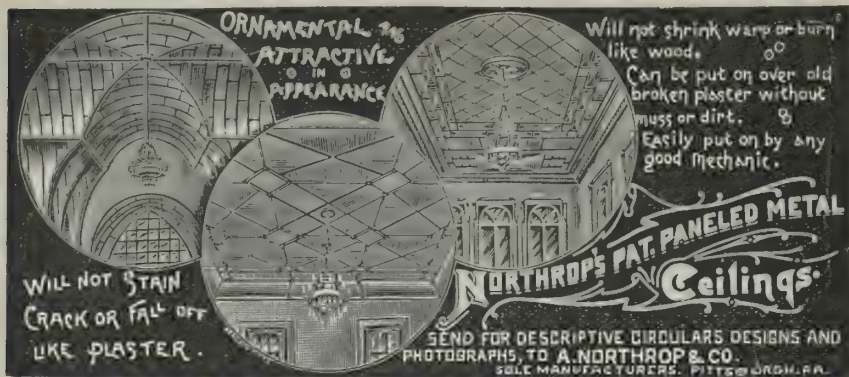
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(Continued from page iv.)

side the cell and water inside. The carbons will, of course, be immersed in the bichromate solution. A current is measured by amperes, not by volts; hence your characterization of your current is meaningless.

(4) O. O. E. says: From a spring 110 rods distant and 40 ft. fall, few bends, what size pipe would I have to lay down to get four horse power from the motors that are made for such purpose? For two horse power? A. You will require a 6 inch pipe, supplying 66 cubic feet of water per minute, 4 1/2 inch pipe for two horse power, 33 cubic feet per minute. You should know the flow from the spring for the power that it will produce. A 3 foot diameter motor will give you four horse power and a 24 inch motor Pelton style will give you two horse power with the quantities of flow as above stated.

(5) C. R. W. asks: What power prevents the bottom course of brick in our large structures from crushing with the tremendous weight above it? Please give me as explanatory reply as possible. What accepted theory is there as cause for the wind blowing? A. The resistance or crushing strength of brick and other building material is far greater than the weight of the superstructure. Architects and engineers understand this, and spread the foundation to meet the pressure from high buildings. A single common red brick, when properly laid in strong cement, is equal to a load of 12 tons, and it will require a column of cement laid brick nearly 10,000 feet high to crush the bottom course. The heat of the sun and the rotation of the earth are the primary causes of the circulation of the atmosphere.

(6) G. W. F. S. asks: What provision can be made for properly carrying off water emanating from a cellar, when the cellar is below point of sewage plant? A. Water cannot be lifted without power. The location and facilities for obtaining it you have not stated, so that in a general way we can say, if you have gas, a small gas engine and pump is recommended. If not, a petroleum or gasoline engine and pump, such as is advertised in our columns, is in order. If you have facilities for accommodating a small windmill away from the house, with a suction pipe leading to a deep cesspool in the cellar and discharging into the drainage system, you will find it as inexpensive and easily managed as any device that we can name.

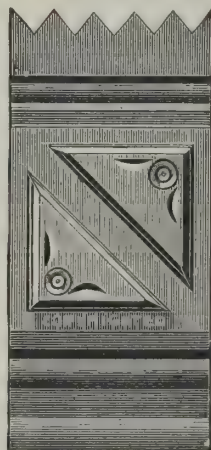
(7) W. L. M. says: I am building a house, and to secure ventilation intend to place ventilating registers in the sides of the walls, the open space between the partition studs being used as a ventilating shaft. Above the attic floor a tube will connect with this shaft and be run either into the chimney flue or out under the eaves of the roof. Now the questions I want answered are these: 1st. Should the ventilators be placed near the floor or near the ceiling? 2. Will the hot foul air ascend this shaft? 3d. Would it be better to run the tube connecting with the air shaft into the chimney flue or out under the eaves of the house? A. For the best arrangement of ventilators in the rooms there should be one at the bottom and one at the top for

(Continued on page viii.)

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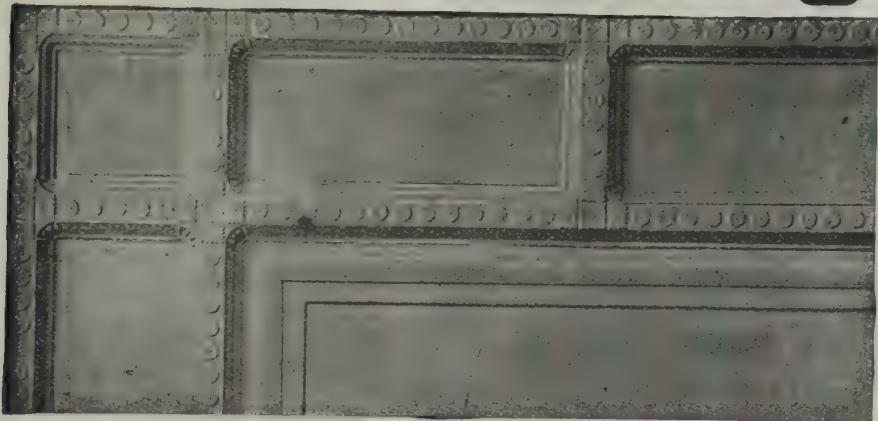
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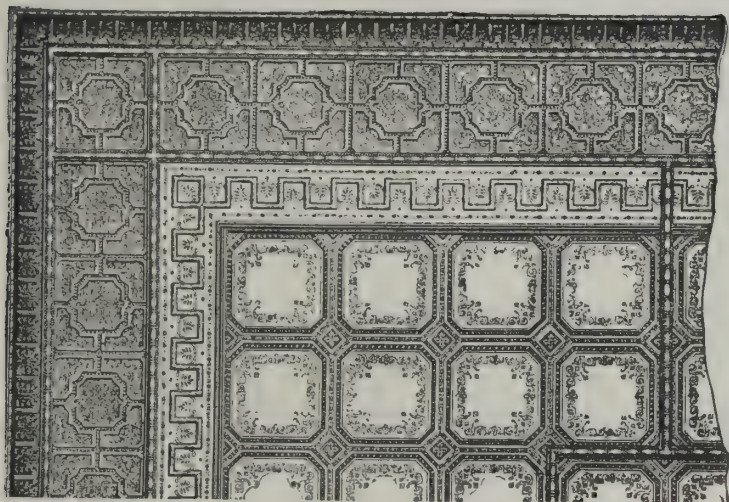


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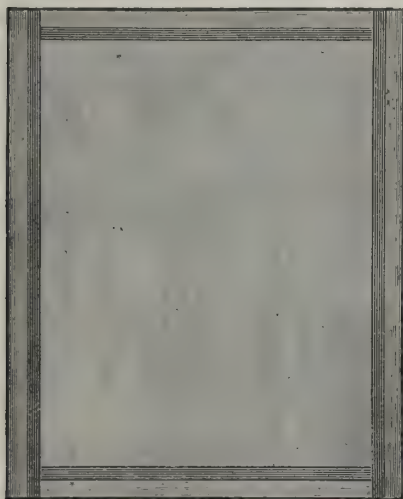
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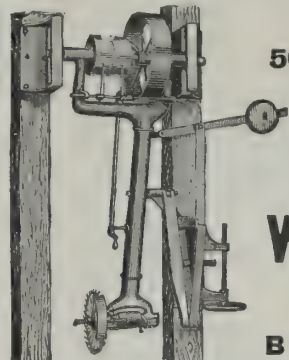
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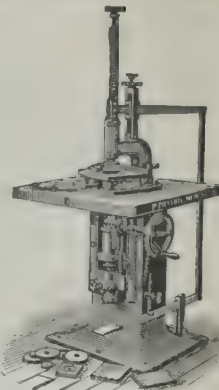
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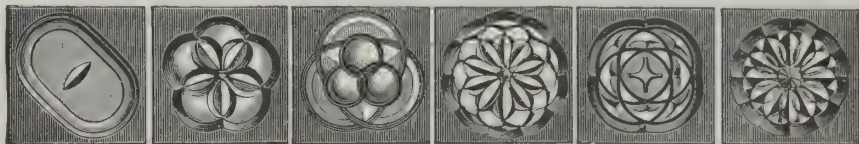
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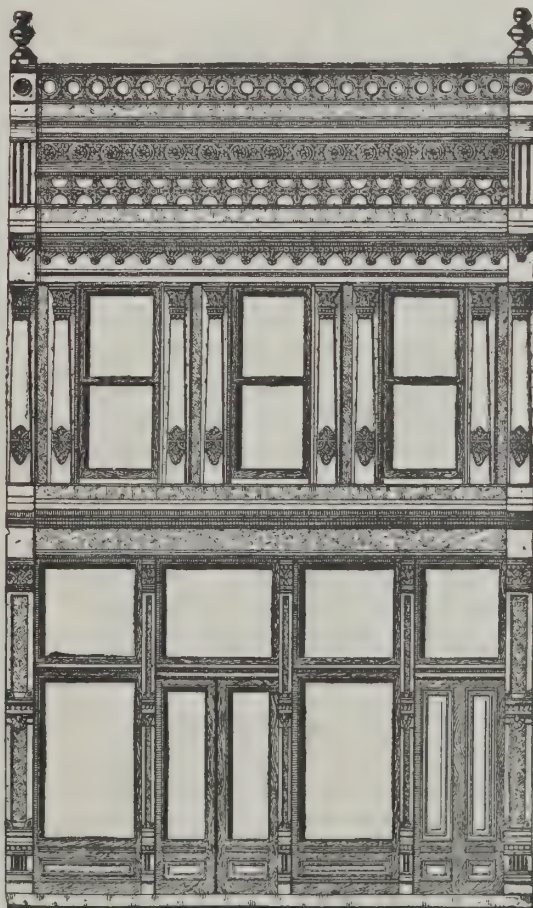
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A. It is an everlasting Plaster of Paris finish for decorating your walls.

Q. Is it a plastering preparation?

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Q. Why do you say it is everlasting?

A. Because it will, when applied to a clean surface, admit of recoating and changing tints for a lifetime, and will remain on the wall, not rubbing or scaling.

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A. Kalsomines are made from inert powders, and are entirely dependent on glue to hold them on the wall; the glue soon decays and the material rubs and scales; in fact, Kalsomines are not claimed to be anything but temporary. Diamond Wall Finish is made from a natural base, in itself a cement, and is not dependent on decaying glue to hold it on the wall, but hardens with age.

Q. How can I learn more of these goods?

A. By watching this space in future issues; or, better yet and much quicker, by writing for full information to DIAMOND WALL FINISH CO., Grand Rapids, Mich.

(Continued from page vi.)

each room. If you choose to use but one, place it at the top in rooms that have a fireplace and at the bottom in rooms that have no fireplace. Under no consideration should the ventilation be connected with the chimney, for there are times when the rooms will be filled with smoke from back draught, besides the danger from fire. The ventilator shaft should rise through the roof, with a draught hood on top. Opening the ventilator under the eaves is not good practice. The pressure on the windward side will make a strong down draught in windy weather.

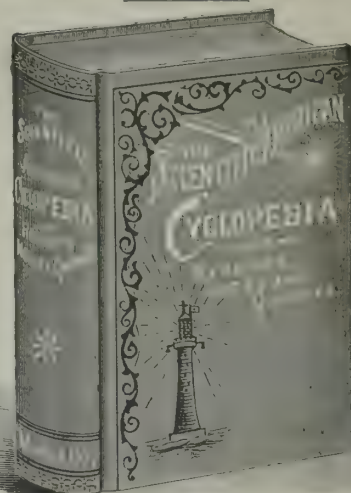
(8) J. W. C. asks: 1. Given a hollow air-tight body which with the superadded weight of one ton will be exactly submerged in water, what additional weight will be required to sink it thirty feet below the surface of the water? A. The compressibility of water is 0.0004663 of its own bulk at 15 lb. pressure, so that if your apparatus displaces one ton water, then  $0.0004663 \times 2,000 \text{ pounds} = 0.9326$  of a pound to sink it 34 feet after it is under water. This will also be somewhat modified by the elasticity of the hollow vessel, which is also subject to compression, and if it has as much or more compressibility than water under the increasing pressure of depth, it will go to the bottom without additional weight.

(9) W. P. D. writes: During last fall's drought we dug a cistern, at a depth of ten feet found moisture. It was walled up with brick and cement and bottom laid with same. (Star brand cement being used.) Later on, when the ground became thoroughly wet, a leak showed in bottom, and water rose two feet deep. It was pumped out and another layer of brick and cement was put down, making the bottom double, but it filled with water just the same. What had we best do to secure good results and make it hold full up? Would the water go out during drought as it came in? It is now half to three-fourths full. All comes through the bottom. A. The water will doubtless disappear in the dry season. The remedy will be to pump out the cistern, plaster walls and bottom with best Portland cement, neat, then put in another bottom and walls of brick laid up in the cement.

(10) J. H. K. asks: 1. How are school blackboards made? A. The best mixtures contain a vehicle, often shellac varnish, with emery or ground pumice to give "tooth," and lampblack or other pigments, often with a little Prussian blue. See the "Scientific American Cyclopaedia," \$5 by mail. 2. How can gas be lit by electricity and what is a simple way? A. By a spark coil, three or four Leclanche batteries in

(Continued on page xii.)

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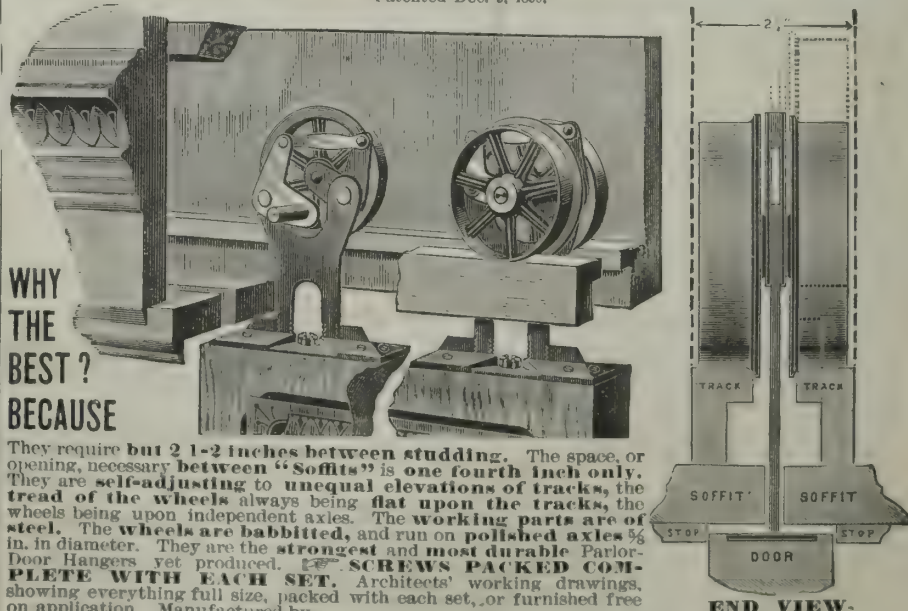
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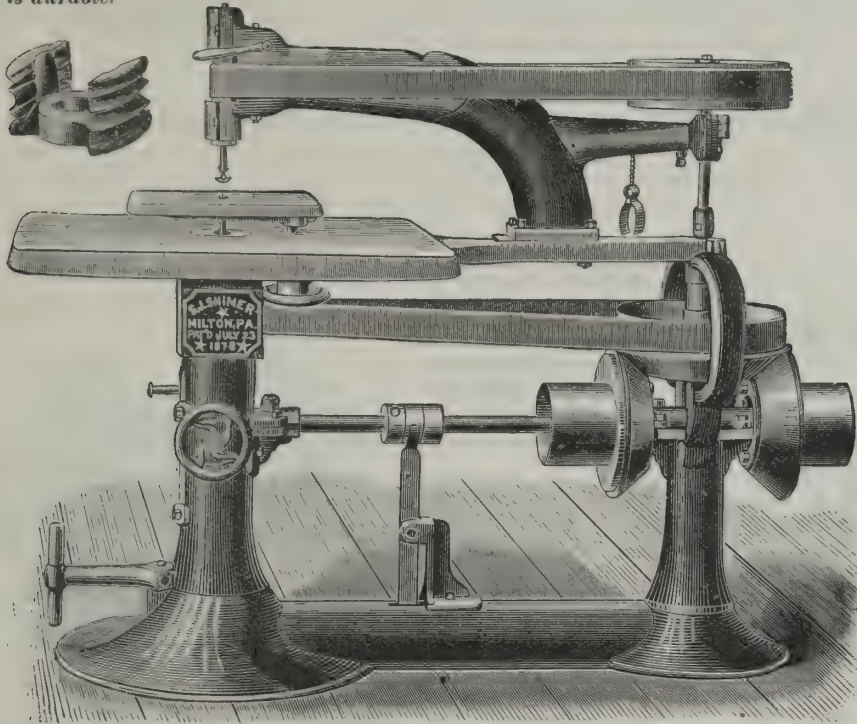


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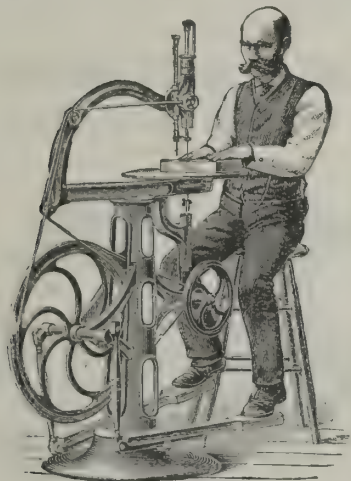
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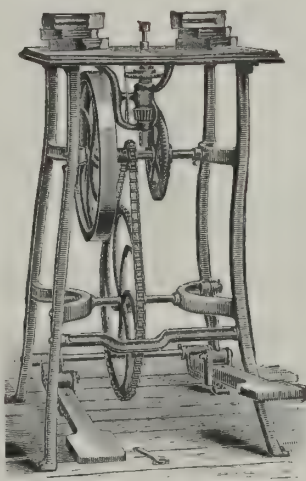
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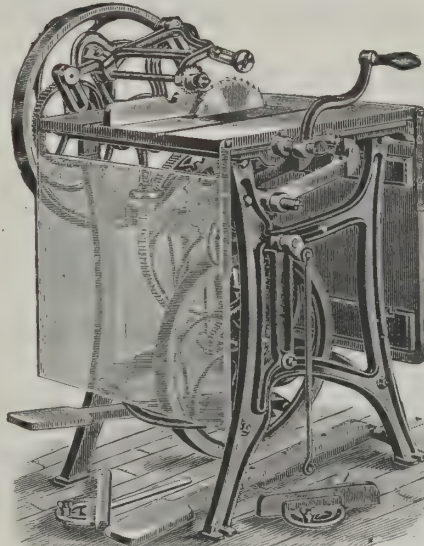
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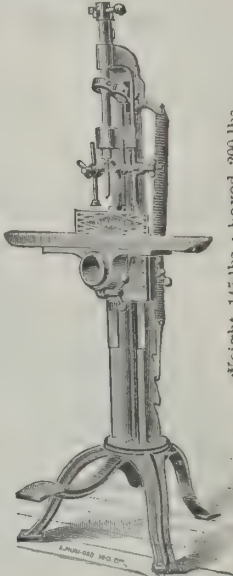
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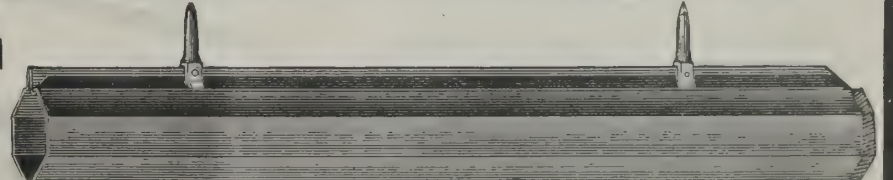
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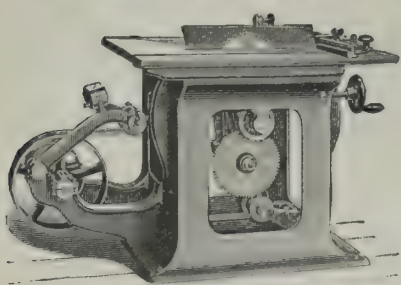
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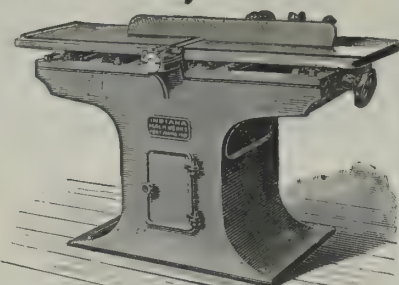
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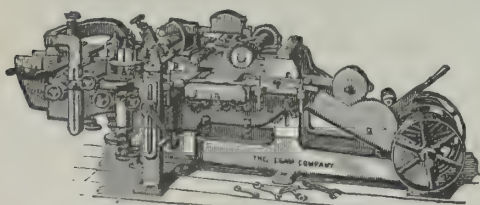
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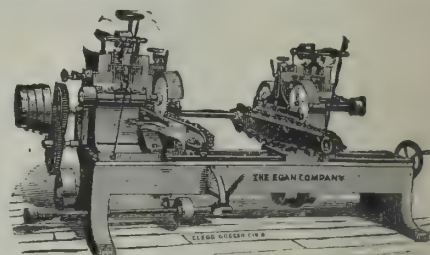
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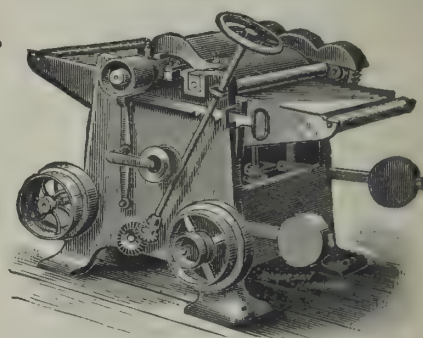
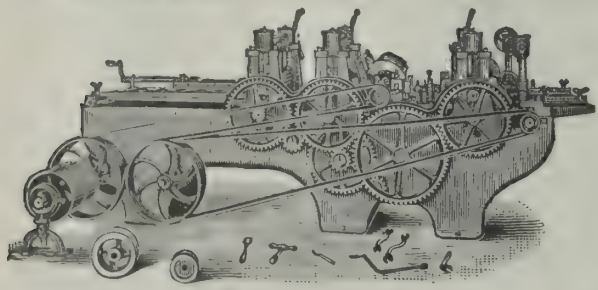
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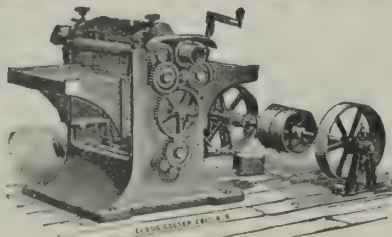
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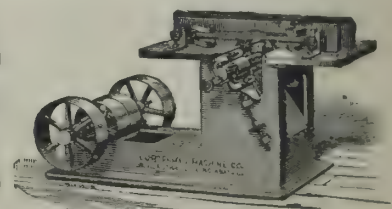
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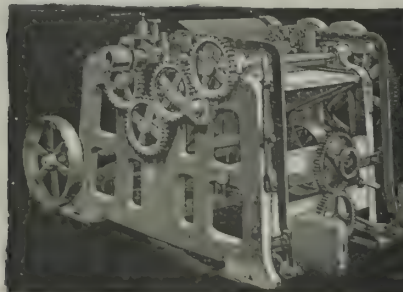
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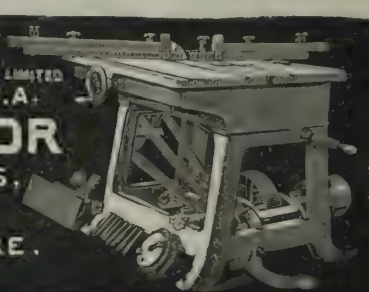
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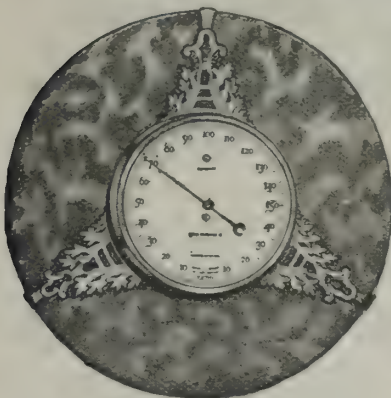
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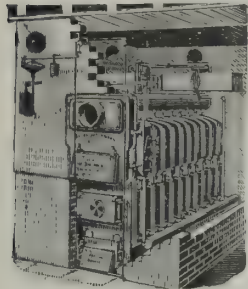
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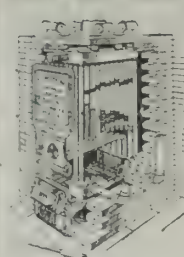
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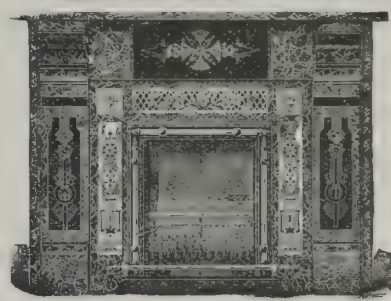
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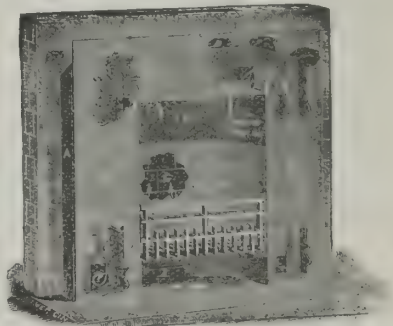
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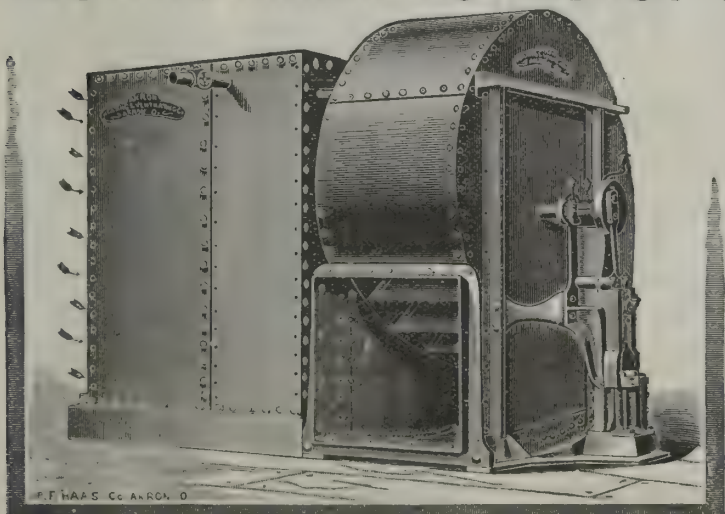
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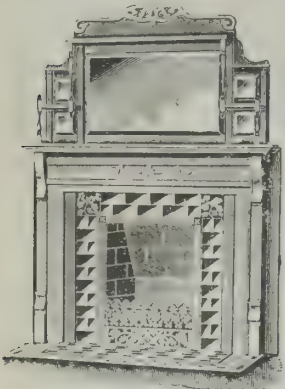
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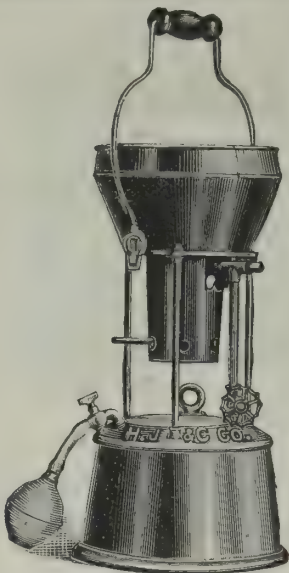
(Continued from page viii)

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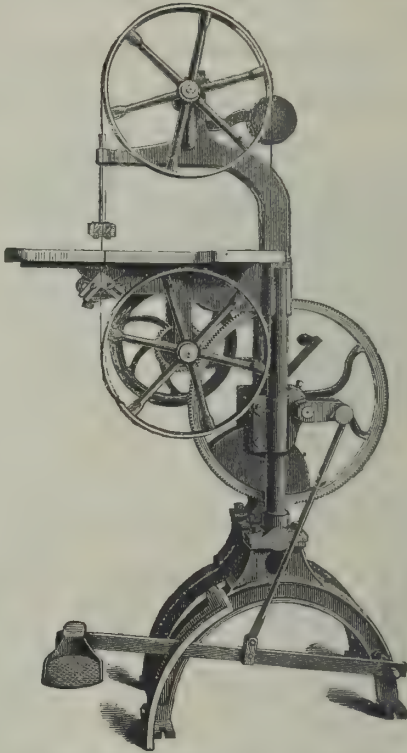


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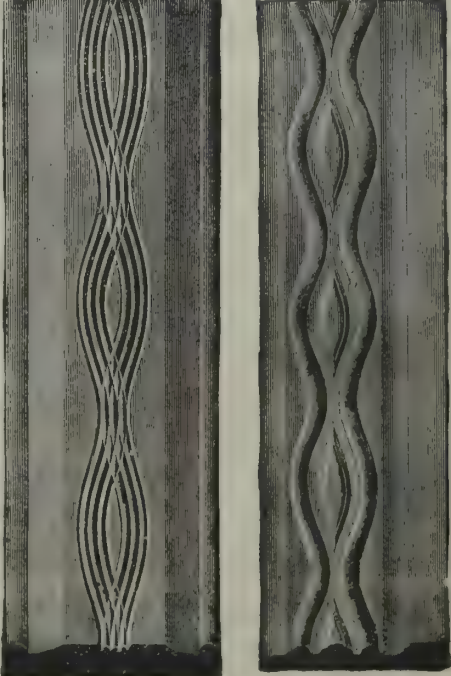
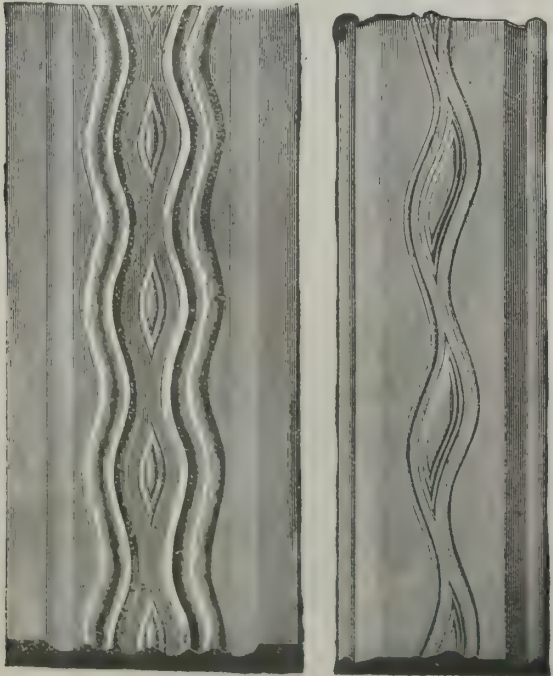
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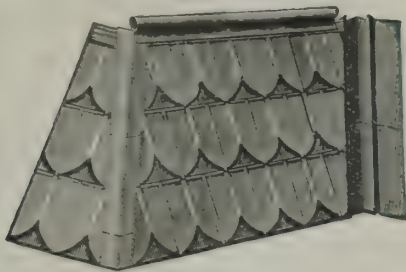
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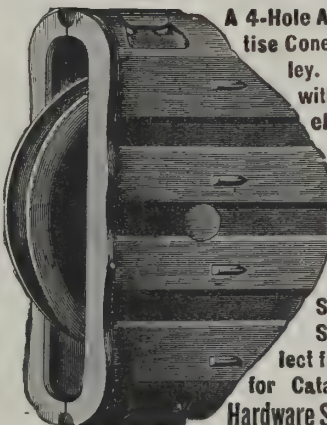
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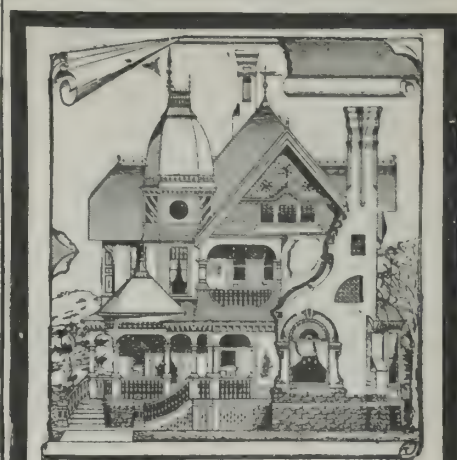


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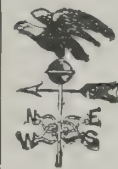
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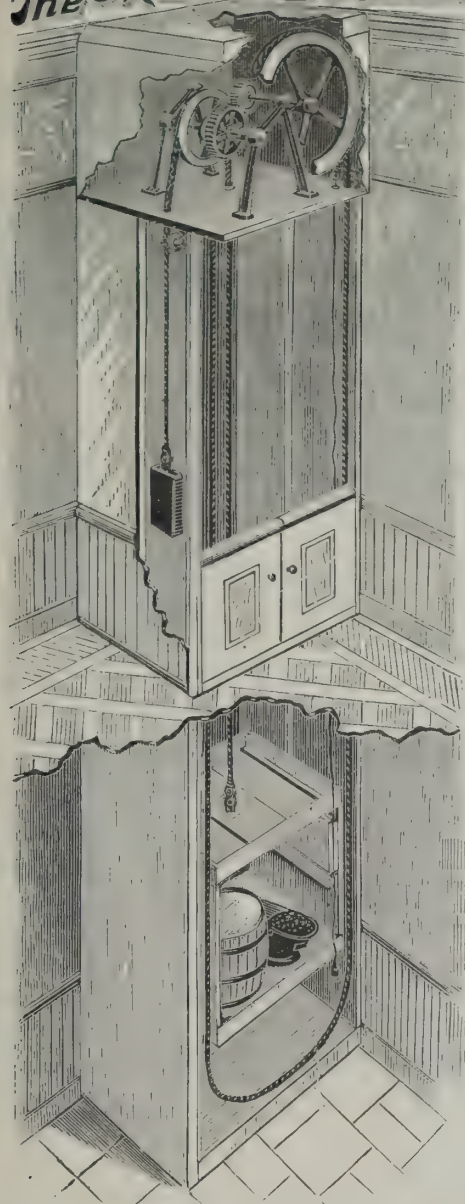
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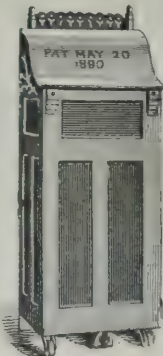
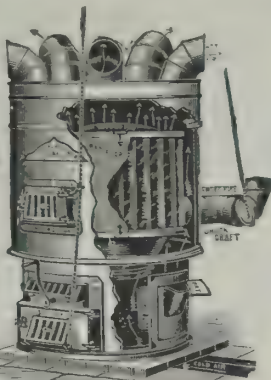
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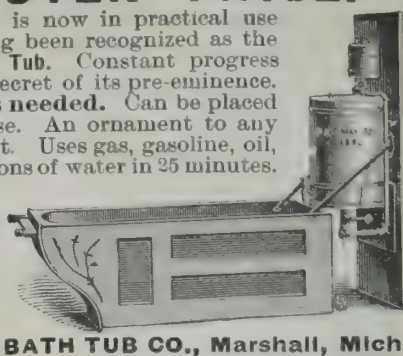


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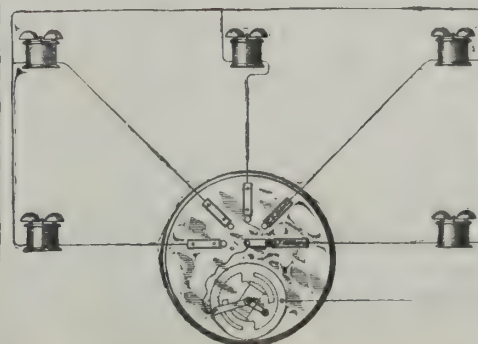
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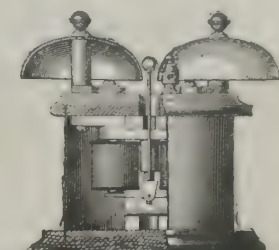
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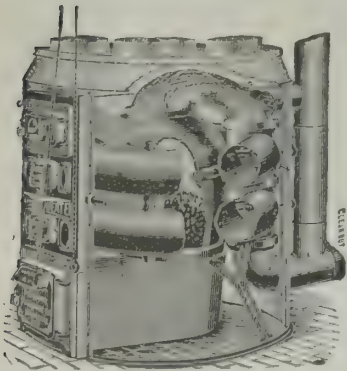
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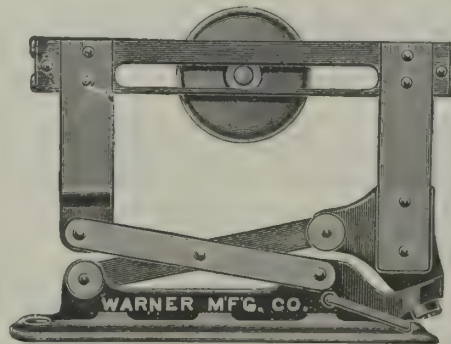
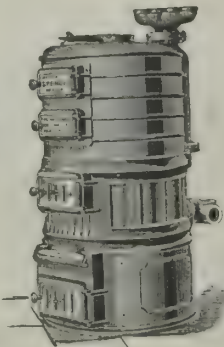
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No. 6.



A CHURCH AT UPPER MT. CLAIR.

[See page 81.]





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### A COTTAGE AT BENSONHURST, LONG ISLAND.

We illustrate in one of our plates in colors this month a cottage recently erected for Thomas Golding, Esq., at Bensonhurst, Long Island, from plans prepared by Mr. Paul F. Higgs, architect, New York.

Dimensions: Front, 32 ft.; side, 39 ft. 4 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 8 ft.; third, 7 ft. The underpinning is built of brick, while the building above is of wood. The first story is clapboarded and painted olive brown, with bottle green trimmings; second story shingled and painted yellow, with similar trimmings. Blinds painted bronze green. Roof shingled and painted moss green. The interior throughout is trimmed with whitewood, finished natural. The doors and windows have beaded casings and turned sunk angle blocks. The hall, spacious, contains an ornamental staircase, which starts near the center of hall toward the front, and has a platform at a height of five steps, at which point the ascent is reversed toward the rear. Library is well lighted and it is separated from main house. Parlor and dining room are provided with octagon projections and fireplaces, built of brick, and furnished with tiled hearth and facings and hard wood mantels, with beveled plate glass mirrors of excellent design. Kitchen is wainscoted and fitted up with wash trays, sink, dressers, pantry, etc. Second floor contains four large bed rooms and bath room, the latter wainscoted and replete. Two bed rooms and ample storage on third floor. Ceilings are corniced. Cemented cellar, under whole of house, contains furnace. Cost \$3,450 complete. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

### A RESIDENCE AT PLAINFIELD, N. J.

One of our plates in colors this month illustrates "Cobwell Hall," a residence recently erected for Oscar S. Teale, Esq., at Plainfield, N. J.

Dimensions: Front, 42 ft. 4 in.; side, 52 ft. 4 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The design is excellent, and in the arrangement of rooms all the space is utilized to the best advantage. The underpinning and first story are built of local brick; second and third stories are shingled and painted colonial yellow, with bottle green trimmings. Roof shingled. Large sliding doors connect the principal rooms on first floor. The front lobby is trimmed with quartered oak, and it has a tile floor, two closets, and a window seat. Front hall is also trimmed with quartered oak, and it is furnished with a paneled wainscoting, brick fireplace, and an ornamental staircase turned out of similar wood. Parlor is trimmed with mahogany, library with sycamore, and dining room with chestnut. The latter has a paneled wainscot and stained glass windows. The fireplaces are furnished with tiled hearths and hard wood mantels. Butler's pantry is trimmed with oak and properly fitted up with cupboards, drawers, bowl, etc., complete. Kitchen is wainscoted and trimmed with ash, and is provided with range, set in fireplace, large pantry, lobby, and sink complete. Second floor is trimmed with white pine, finished natural, and contains six bed rooms, large closets, and bath room. Bath room is wainscoted and furnished replete. Two bed rooms on third floor. Cemented cellar contains laundry, furnace, and other necessary apartments. Cost about \$12,000. Mr. Oscar S. Teale, architect, 247 Broadway, New York. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

### THE CRESCENT BLOCK, BRIDGEPORT, CONN.

We publish on pages 82 and 83 engravings and floor plans of the Crescent block, erected for Henry Sanford, Esq., on Golden Hill, at Bridgeport, Connecticut. The design is excellent and the plan is arranged to form a crescent. The underpinning and first story are built of rock-faced red sandstone. The building above is built of North Haven palette brick, laid up in red mortar, with terra cotta cornice and trimmings. The tower domes are of copper. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. Halls, trimmed with antique oak, contain ornamental staircases, with carved newels, posts, etc. Parlors and libraries are trimmed with cherry and dining rooms with oak. Fireplaces where shown are furnished with tiled hearths and facings and hard wood mantels, with beveled plate mirrors, etc. Butler's pantries are fitted up with dressers, sinks, and dumb waiters complete. Each house has a cemented cellar, containing kitchen, laundry, furnace and other necessary apartments; the former furnished complete and trimmed and wainscoted with yellow pine finished natural. The second floor in each house contains two large bed rooms, closets, with wardrobes and wash bowls and bath rooms, while the third floor contains three bed rooms and storage. These apartments are trimmed with whitewood; second floor stained and finished in cherry and the third floor finished natural. Cost \$55,000 for the entire block of six houses complete.

Messrs. Longstaff & Hurd architects, Bridgeport, Ct. Our engravings were made direct from photographs of the building taken specially for the SCIENTIFIC AMERICAN.

### A RESIDENCE AT BABYLON, N. Y.

The engravings pages 84 and 85 present a residence erected for Franklin H. Kalbfleisch, Esq., at Babylon, Long Island. The underpinning is built of brick, with stone foundation. The exterior framework is clapboarded and painted light olive green, with bottle green trimmings. Roof shingled and painted red. Dimensions: Front, 55 ft.; side, 86 ft., not including front piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. Hall is trimmed with ash. It has a paneled wainscoting, ribbed ceiling, and a nook containing seats and fireplace furnished with tiled hearth and hard wood mantel. The staircase is provided with columns extending to ceiling, the space between being filled in with spindle transoms, supported with brackets, forming Gothic arches. This staircase and hall are lighted effectively with stained glass windows. The floors throughout are laid with yellow pine. Parlor and library are trimmed with mahogany and dining room with antique oak. The fireplaces where shown have tiled hearths and hard wood mantels. Kitchen and its apartments are wainscoted and fitted up with the usual fixtures in the best possible manner. There are eight bed rooms, bath room, dressing room and closets on second floor, and two bed rooms and storage on third floor. Cemented cellar contains furnace and other apartments. Cost \$17,500 complete. Mr. H. J. Hardenbergh, architect, 10 West Twenty-third Street, New York.

Our engravings were made direct from photographs of the building taken specially for the SCIENTIFIC AMERICAN.

### A SCHOOL HOUSE AT UPPER MONTCLAIR.

Our engraving, page 86, made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN, presents the Upper Montclair School House, which has been completed from plans prepared by George W. Da Cunha, architect, New York. The foundation and underpinning are built of stone, laid up at random, while the exterior walls above are built of local brick, laid in red mortar. All the exterior woodwork is painted bottle green. Roof is covered with blue slates. The school rooms are all well lighted, ventilated, and conveniently arranged. The front room, 25 ft. by 32 ft., is provided with single seats, and will accommodate 48 pupils, while the two rooms at the rear (15 ft. 9 in. by 30 ft. respectively), which can be separated by double folding doors, have double seats, and will accommodate 44 pupils each. The L room, 20 ft. by 22 ft., is fitted up similarly, and will seat 44 pupils. The interior throughout is trimmed with whitewood, stained and finished in cherry. The floors are laid with yellow pine. Cemented cellar under whole of building is divided in center, and each apartment is furnished with a toilet replete. The building is heated and ventilated by the Rutan-Smead system. Cost of building, \$8,700; cost of heating and ventilating, \$3,500; total, \$12,200.

### HOUSES NEAR NEW YORK.

On page 87 we give perspectives of several very attractive dwellings located near New York. In subsequent numbers we hope to illustrate more fully some of these houses, giving floor plans and particulars.

### A DWELLING OF MODERATE COST.

We present on page 89 a suburban dwelling of low cost, erected for Mr. William Wagner, at Lowerre, New York. The foundation is of stone, laid up at random. The first story is clapboarded and painted light olive green, with dark olive green trimmings; second story shingled and stained sienna. Roof shingled and painted red. Dimensions: Front, 24 ft.; side, 34 ft., exclusive of piazza and porch. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. The interior throughout is trimmed with white pine, finished natural. The doors and windows have beaded casings and turned sunk angle blocks. Hall contains an ornamental staircase. Parlor and dining room are provided with fireplaces, furnished with tiled hearths and wood mantels. Kitchen is wainscoted with narrow beaded stuff and fitted up with wash trays, sink, pantry and fireplace replete. There are four bed rooms and bath room on second floor and two bed rooms on third floor. Cemented cellar under whole of house contains furnace and other necessary apartments. Cost \$2,800 complete. Mr. Geo. Palliser architect, New York.

Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

EXAMPLES have been found in this country of kyanized timber which was in a good state of preservation after twenty-eight years' exposure, but it seldom lasts a very long time when used for railway sleepers.



A CHURCH AT UPPER MONTCLAIR, N. J.

The engraving on page 79 presents St. James' Episcopal Church, at Upper Montclair, N. J. The design is picturesque. The exterior walls are built of local rock-faced stone, laid up at random with trimmings of Indiana limestone. Steps of brownstone. Roof covered with blue slates. The auditorium, 30x60, has a seating of 120 as now arranged, but if necessary 300 can be easily accommodated. The pews are of ash. The rood screen, chancel rail, altar and altar table are built of antique oak, highly polished, and designed by Tiffany & Co., New York. The rood screen has oak columns, with carved capitals extending to ceilings, supporting Gothic arches. The windows throughout are glazed with delicately tinted cathedral glass. The roof beams are exposed to view and are dressed and

bureau in this line. A pamphlet of instructions will be sent free, containing full directions how to obtain a patent, costs, etc. In very many cases, owing to their long experience, they can tell at once whether a patent probably can be obtained; and advice of this kind they are always happy to furnish free of charge. Address Munn & Co., SCIENTIFIC AMERICAN office, New York.

A RESIDENCE AT LUDLOW, N. Y.

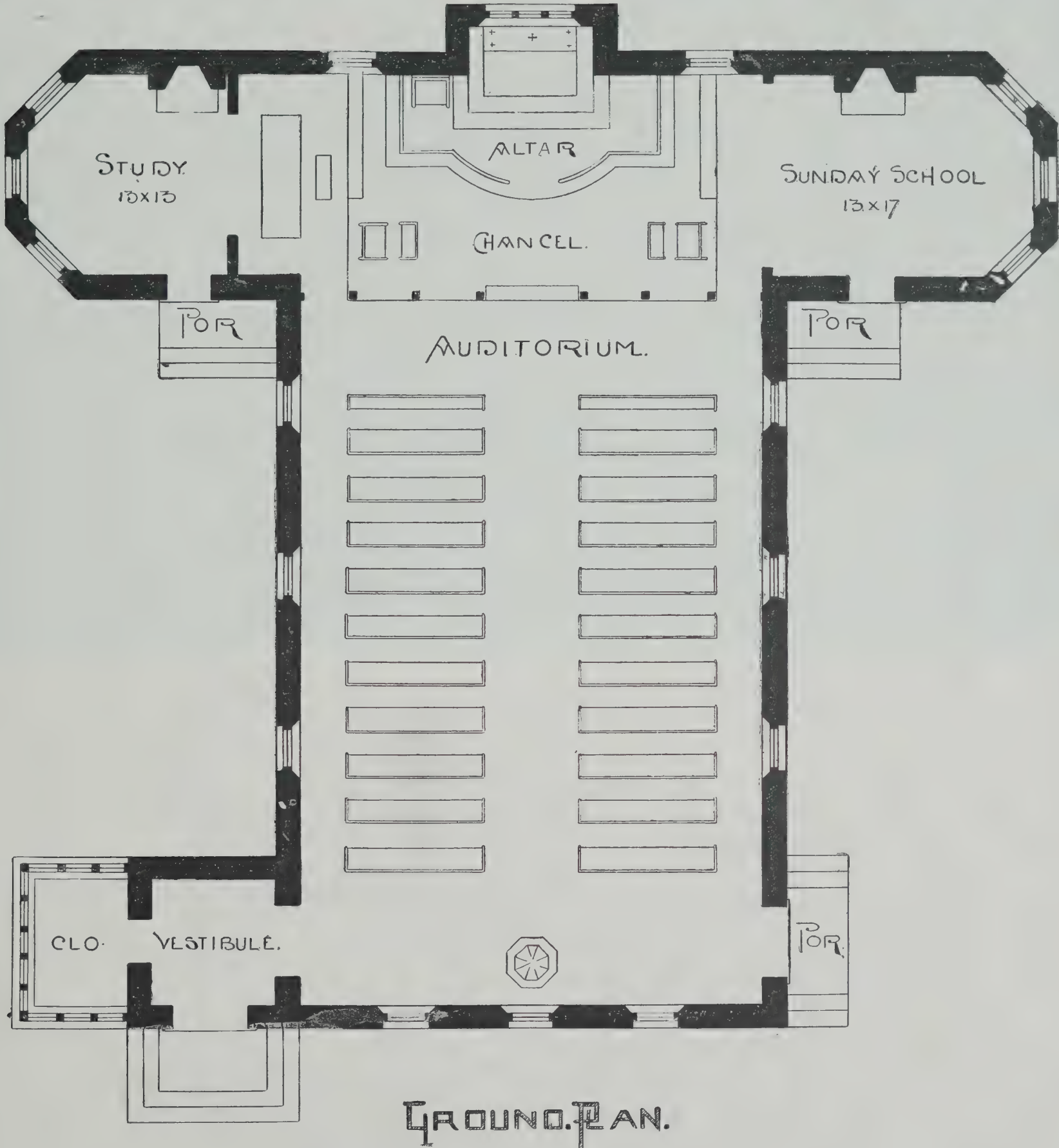
We present on page 90 a residence recently erected for Theodore Crane, Esq., at Ludlow, N. Y. Dimensions: Front, 38 ft.; side, 53 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. Foundation, stone. Underpinning of brick. First story clapboarded. Second story shingled. Roof shingled. Painted pearl

bowls complete. Bath room is wainscoted and fitted up in the usual manner. Cemented cellar contains furnace and other necessary apartments. Cost \$8,500 complete. Mr. Benjamin Silliman architect, Yonkers, New York.

Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

A SUMMER RESIDENCE, ASBURY PARK.

We publish on page 91 a summer residence, erected for William Mills, Esq., at Asbury Park, New Jersey, from plans prepared by the proprietor. Dimensions: Front, 43 ft.; side, 56 ft., exclusive of piazza and portecochere. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The principal feature



A CHURCH AT UPPER MONTCLAIR, N. J.

ornamented. Sunday school room, 13x17 ft., and rector's study, 13x13 ft., are connected with auditorium by double folding doors. These apartments are well lighted and provided with outside entrance and open fire places furnished with tiled hearths and slate mantels. Cemented cellar, under whole of building, contains furnace and other apartments. Cost \$8,000 complete. Lamb & Rich architects, New York.

Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

If any of our readers have made an invention for which they have thoughts of taking a patent, they are invited to communicate with Messrs. Munn & Co., the publishers of this paper, who for a period of forty-three years have conducted a most successful

gray, with dark gray trimmings. The hall is trimmed with California ash. It contains a paneled wainscoting, divan and staircase with carved newels, posts, etc. This hall and staircases are lighted by windows glazed with stained glass. The principal rooms on first floor are connected by double sliding doors. Parlor is trimmed with cherry and it is provided with an open fireplace, furnished with a tiled hearth and a hard wood mantel, with mirror, etc. Library and dining room are trimmed with oak. The latter having a paneled wainscoting and fireplace. Kitchen and its apartments are trimmed and wainscoted with white pine, finished natural and furnished complete. There are four bed rooms, den and bath room on second floor, and two bed rooms and trunk room on third floor. These apartments are trimmed with whitewood finished natural. The closets are provided with wash

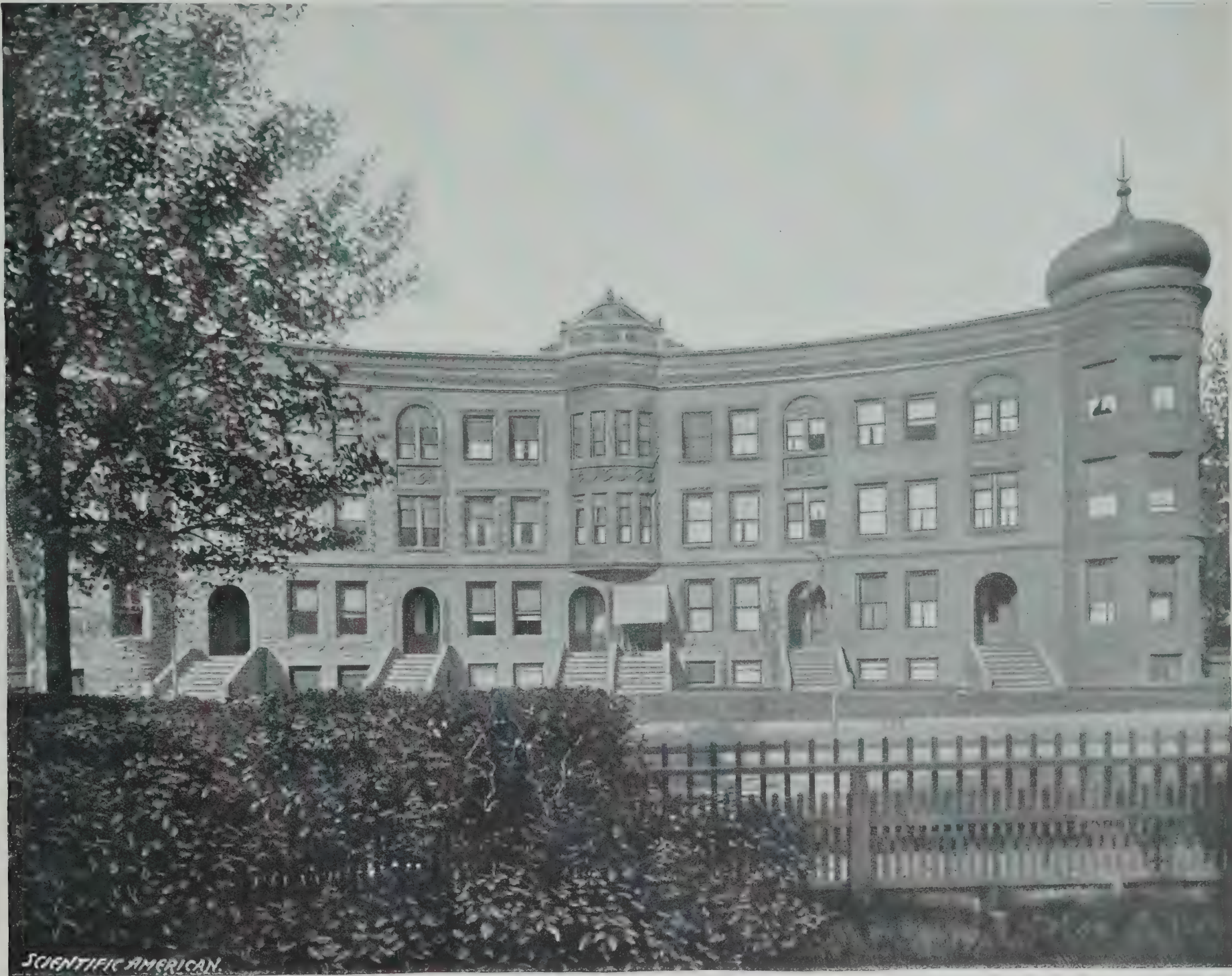
is the spacious piazza and veranda. The underpinning is built of brick, while the building above is of wood, clapboarded and painted pearl gray, with bottle green trimmings. Roof, slated; lobby has a tiled floor; hall, trimmed with ash, contains an ornamental staircase. Parlor is trimmed with cherry, and it has an open fireplace, built of brick and furnished with a tiled hearth and mantel. Library is provided with fireplace, with bookcases on each side of same. Dining room is furnished with four china closets. Kitchen and its apartments are wainscoted and fitted up replete. There are five bed rooms, large closets, and bath room on second floor, and four bed rooms on third floor. Cemented cellar contains furnace and laundry. Cost \$6,250 complete. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.





CRESCENT BLOCK, BRIDGEPORT, CONN.





[See page 80.]





SECOND FLOOR PLAN.

[See page 80.]

A RESIDENCE AT BABYLON, N. Y.



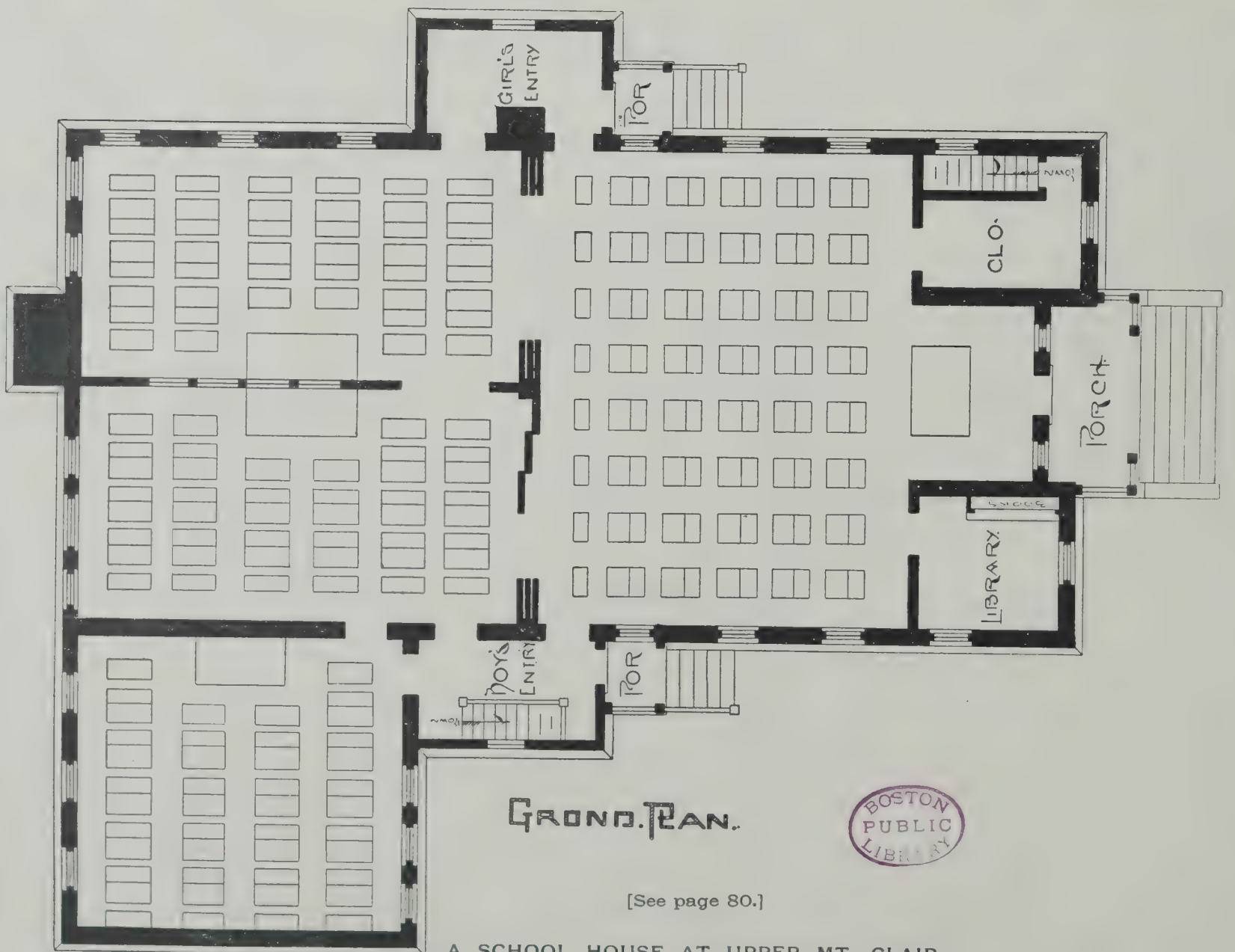




[See page 80.]

A RESIDENCE AT BABYLON, N. Y. ;





A SCHOOL HOUSE AT UPPER MT. CLAIR.





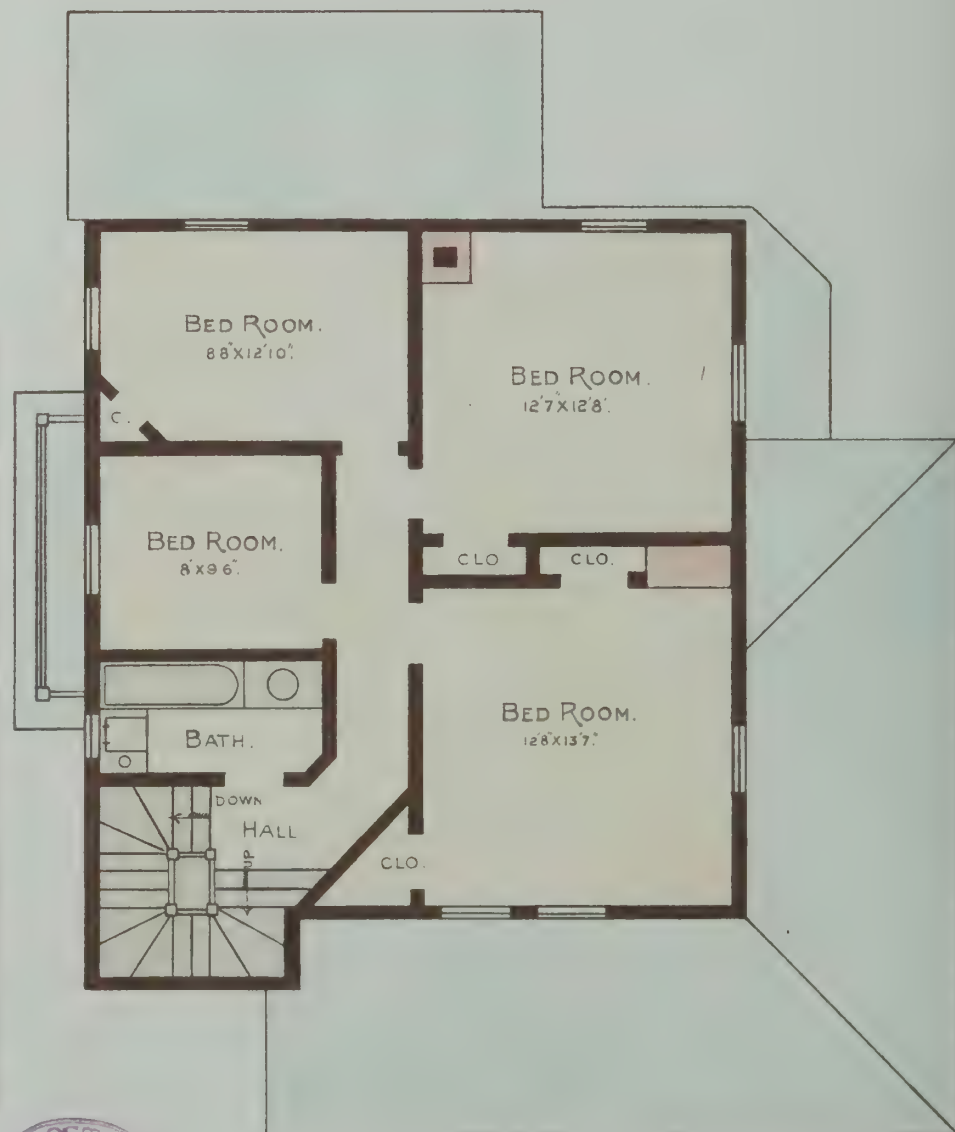




A COTTAGE AT BENSONHURST, N.Y.



FIRST FLOOR.



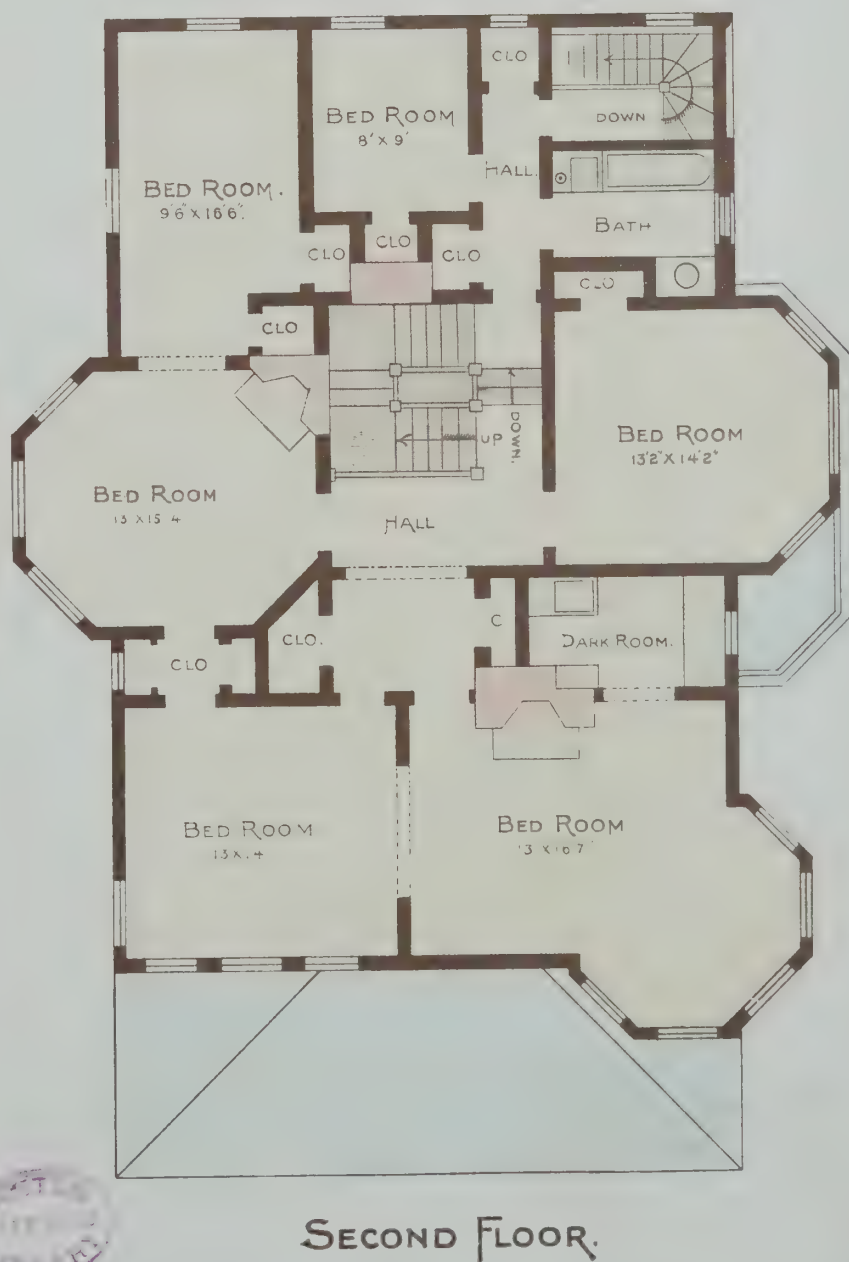
SECOND FLOOR.







A RESIDENCE AT PLAINFIELD, N.J.











[See page 80.]

63. Facade, Jewish Synagogue, Lexington Avenue, N. Y.  
71. Refreshment Pavilion, Central Park, N. Y.

203. Mr. Tingue's Residence, Portchester, N. Y.  
282. Mr. Augustus Mead's Residence, Belle Haven, Conn.

328. Residence on road from Portchester to Rye Lake.  
300. Mr. W. B. Higgins' Residence, Belle Haven, Conn.



### PROPOSED RAILWAY TOWER FOR THE COLUMBIAN EXPOSITION.

Among the numerous designs submitted for a tower for the Columbian Exposition is one as shown in the accompanying cut, taken from a sketch made by J. E. Harriman, Jr., a civil engineer of Boston.

Mr. Harriman has not only designed an observatory tower, but has combined with it the novel feature of a winding slide all the way from the top to the bottom.

This scheme would give passengers the opportunity of viewing the magnificent scenery and beautiful buildings of the fair from the different altitudes as they come down, each time describing larger circles and covering more space until they reached the bottom.

It will be seen that the proposed tower consists of four double main columns, coming together at the top, on which rests a building to be used as an observatory and for other purposes. Running from the center at the bottom perpendicularly to the top is a shaft to be used in carrying up the elevator cars and passengers.

It is proposed that each car shall have a guide or conductor, and be arranged to carry ten passengers. Starting from the bottom of the tower, the car would be carried up to the top, where the party alights and a party ready to descend taken in.

The car then leaves the elevator well, and enters upon the slide that is to carry it back to the starting point.

This slide descends on about a five per cent grade; the car to be controlled by automatic brakes as well as by the conductor. The sides of the slide are protected by steel gratings, and it has a water and sun proof top.

When the car has almost reached the ground, the grade ascends again and brings the car to a standstill by the time it reaches the starting point.

The architect has not affixed any definite height to the tower, which could vary from that of Bunker Hill Monument to the height of the famous Eiffel Tower. If the tower was 500 feet high the slide would be about 1.9 miles long; if 1,000 feet high, the slide would be nearly four miles.

The cars would be kept a reasonable distance apart, and not travel faster than the electric street cars.

Other means of ascending and descending would be by regular elevators, which pass up and down the column as in the Eiffel Tower.

The room necessary for the proposed tower would be only the space taken up by the columns, as it could be erected over the largest of the buildings or a large arena could be made of the space between the columns.

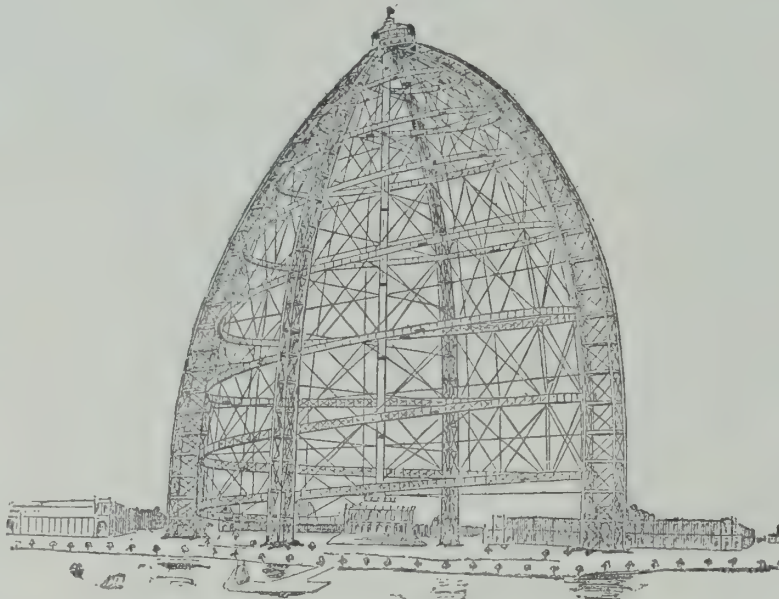
The structure is designed to be made of steel, and the slide is supported by wire cables and rods. It would be all made in sections, and bolted and riveted together, and could be easily transferred by taking it apart.—*Boston Herald.*

#### THE CITY HALL, PHILADELPHIA.

The magnificent new City Hall, which has been in course of construction for twenty-one years, is now sufficiently near completion to accommodate many of the city and county offices, and some of the courts, all of which will eventually be removed to this noble building. The great pile of white marble, larger than any other single building on this continent, is surrounded by a grand avenue, 135 ft. wide on the eastern, western, and southern fronts, and 205 ft. wide on the northern front. The dimensions are 470 ft. from east to west and 486½ ft. from north

to south. The structure contains 750 rooms, fitted with every convenience in heat, light, and ventilation, the whole being absolutely fireproof and indestructible. Its cost, thus far, has been about \$15,000,000, exclusive of the site, which represents a value of at least \$5,000,000 additional.

Several millions and several years will be required to complete the work. On the north front of the building rises the tallest tower in the world, surmounted by a heroic statue of William Penn, 36½ ft. in height. From the sidewalk to the crown of



RAILWAY TOWER PROPOSED FOR THE WORLD'S FAIR.

Penn's broad-brimmed hat the distance will be 547 ft. 3½ in.

The next highest building on the earth is the Cologne Cathedral, 510 ft. The Washington Monument is 32½ in. higher, but cannot properly be classed as a building in the same sense as the City Hall. The latter will be 67 ft. higher than the Great Pyramid, 100 ft. higher than St. Peter's, Rome, and 187 ft. higher than St. Paul's, London, while it nearly doubles in altitude the Capitol at Washington.

The tower has now reached a height of 337 ft., and it is estimated that it will cost a round million dollars to finish it.

#### Cork Pavement.

A new material for paving is now being introduced into London. It is composed of granulated cork and

bitumen pressed into blocks, which are laid like bricks or wood paving. The special advantage of the material lies in its elasticity. When used for pavement it gives a soft tread which is exceedingly pleasant, recalling the feel of a carpet. In roadways it furnishes a splendid foothold for horses, and at the same time almost abolishes the noise which is such an unpleasant feature of city traffic. A short piece of pavement is to be seen in Liverpool Street, E. C.; while the outlet to Pickford's yard in Gresham Street is laid with this material. It yet remains to be seen how it will bear the ordinary traffic of a London street, but there is evidence to show that in Australia short pieces of roadway have given good results.

#### Best Treatment of Hard Wood Floors.\*

BY F. T. COPPINS.

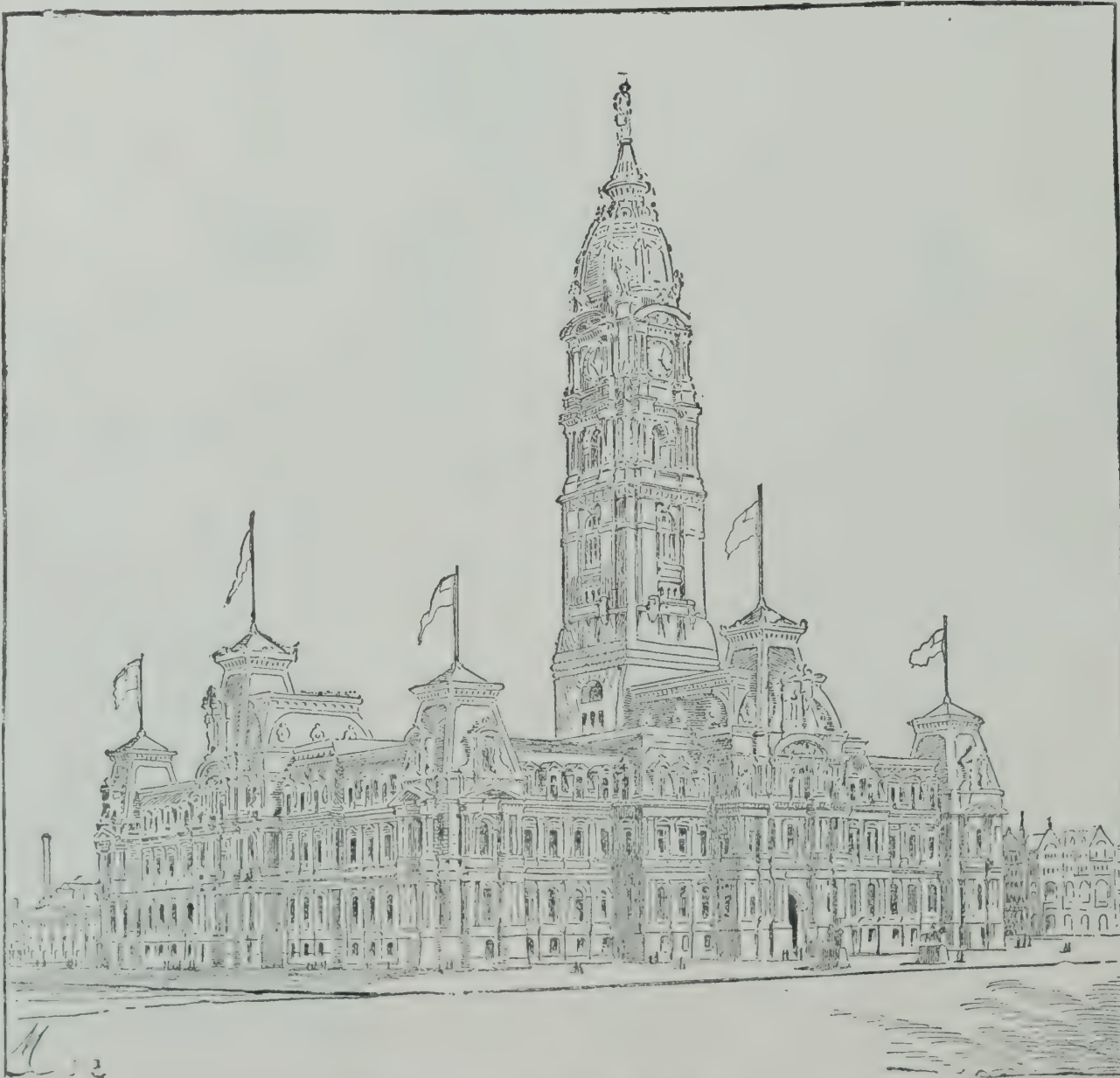
My object in treating this subject is not to lay down iron-clad formulas for the treatment of hard wood floors, but to give some suggestions from my own experience in finishing them. I am amazed sometimes, in reading specifications in regard to finishing floors. In looking over specifications the other day, I found they called for two coats of oil finish on a maple floor. And again, I read: "Finish all the hard wood floors with three coats of raw linseed oil, well rubbed down." It was a great mistake. I did not finish them in that way. I prefer to give all hard wood floors a coat of hot linseed oil and drier before filling, as I have obtained the best results from so doing. I recommend pure gum shellac for the finish of floors. I have no faith whatever in wax finish, as it gums up, turns black, and is readily stained, and will not wear.

What kind of floors is the finisher called upon to finish to-day? Mostly oak. The finisher has arrived at the house to finish the hard wood floor. The carpenter has just left; the floor is oak, narrow stripes, planed and scraped already. The carpenter was thoughtful enough to have the same painted on the under side, at the suggestion of the architect, which should be done in every case for a well finished floor. A coat of hot oil, as I have suggested, penetrates the pores, gives lasting properties to the floor, and does not resist the filler, as you would suppose. Give floors a heavy application of mineral fillers, rub the filler into the pores of the wood thoroughly, and clean off the surface, leaving the same perfectly free of the filler. Now we are ready for the shellac. Sand-paper smoothly, one coat of orange or white shellac, putty up all holes or defects. Great care must be taken to have

the putty match the wood, as this is very important in a well finished floor. Give one or two more coats of shellac, rub between each coat, and finally rub down with pumice stone and crude oil. Not to a polish, however, as that would make them very slippery; but rub enough to give them a dull finish.

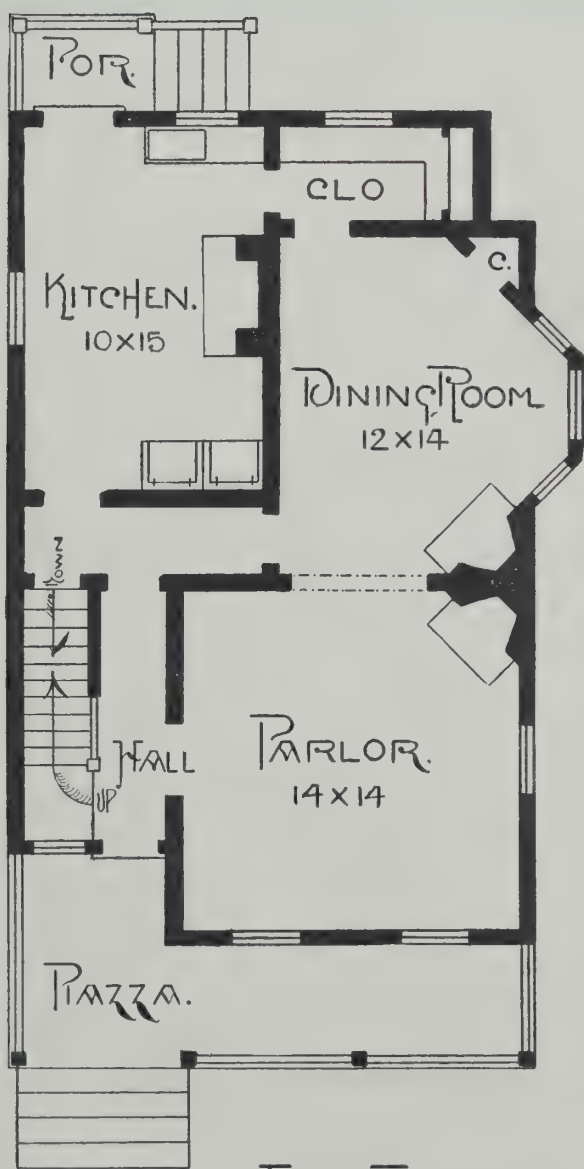
I was called upon last July to finish all the floors in one of our best houses. The floors were oak and the finisher had finished them in brush wax. They had been done only a short time. They were in a bad condition—black, stained, and badly worn at the thresholds. I had them cleaned down to the filler, finished with two coats of white and orange shellac, and rubbed down with crude oil and pumice. They looked well and are in good condition to-day. Parquet floors and borders are in great demand, and I think will soon take the place of carpets (Continued on p. 92.)

\* Paper read before the New York Association of Master Painters and Decorators.

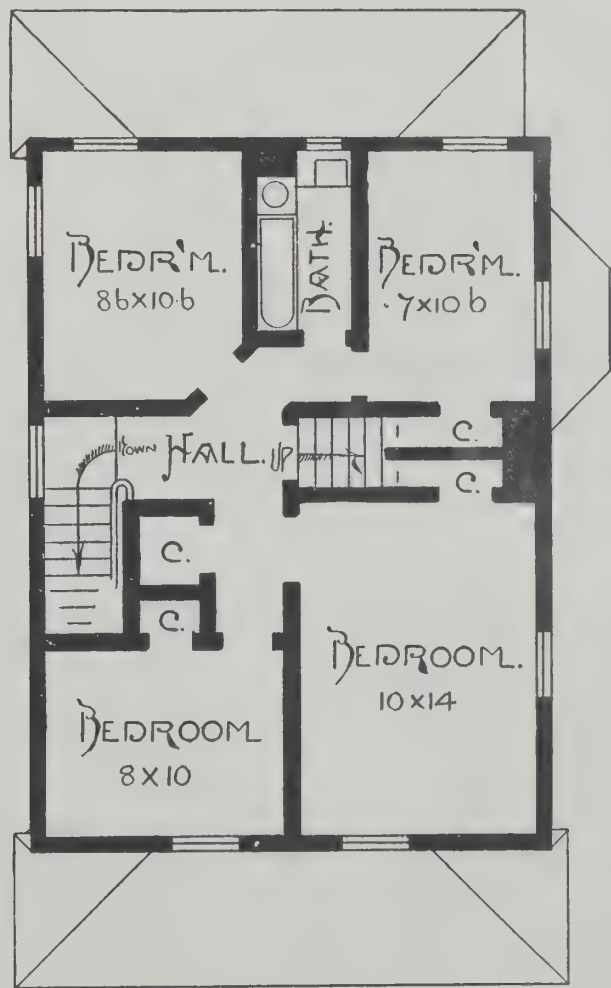


THE CITY HALL, PHILADELPHIA.





FIRST FLOOR.

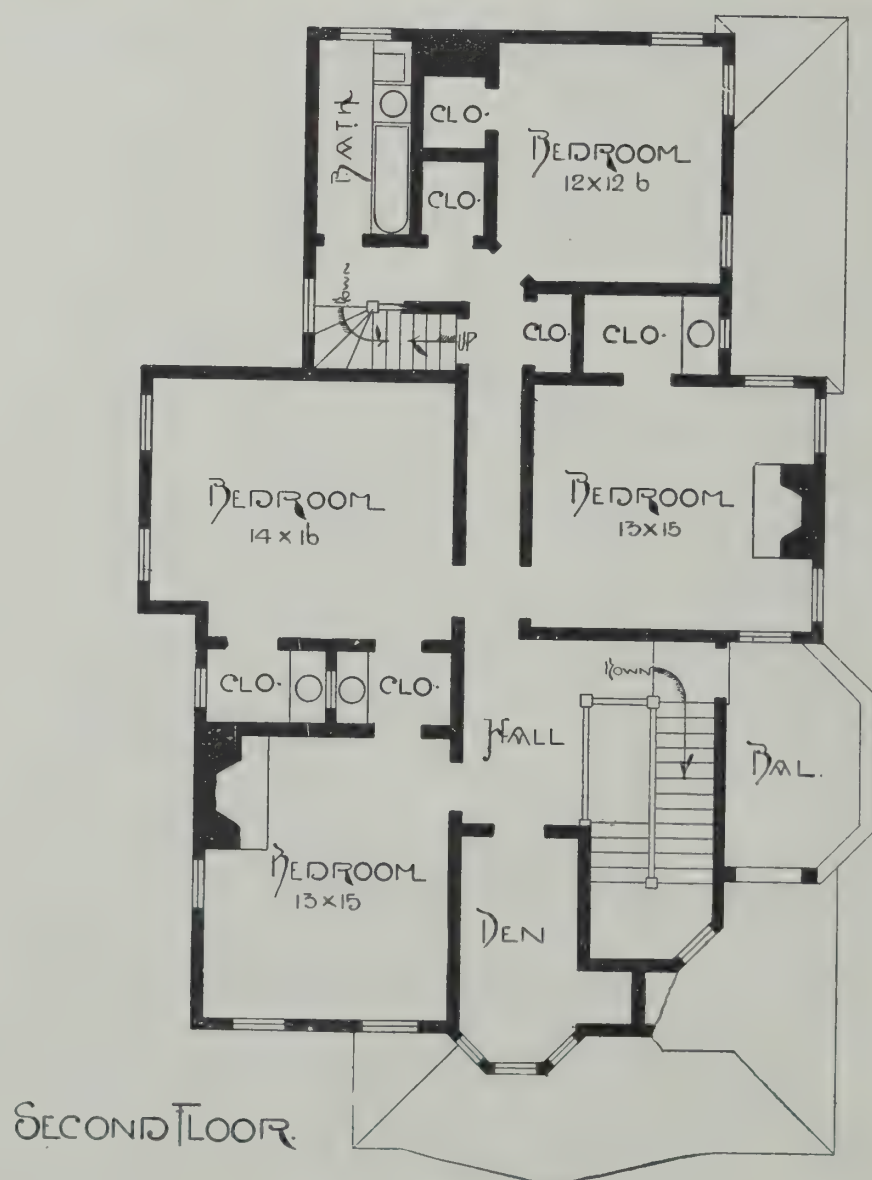
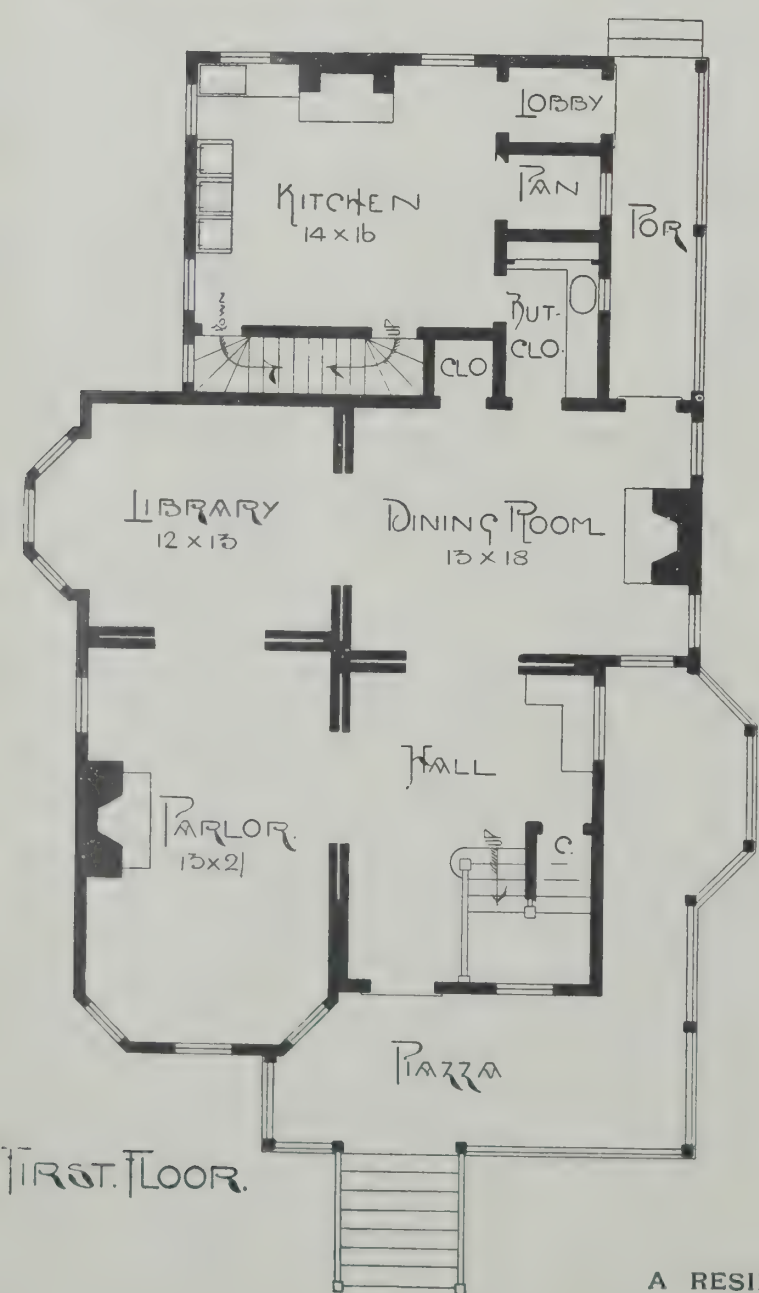


SECOND FLOOR.

[See page 80.]

A DWELLING OF MODERATE COST,



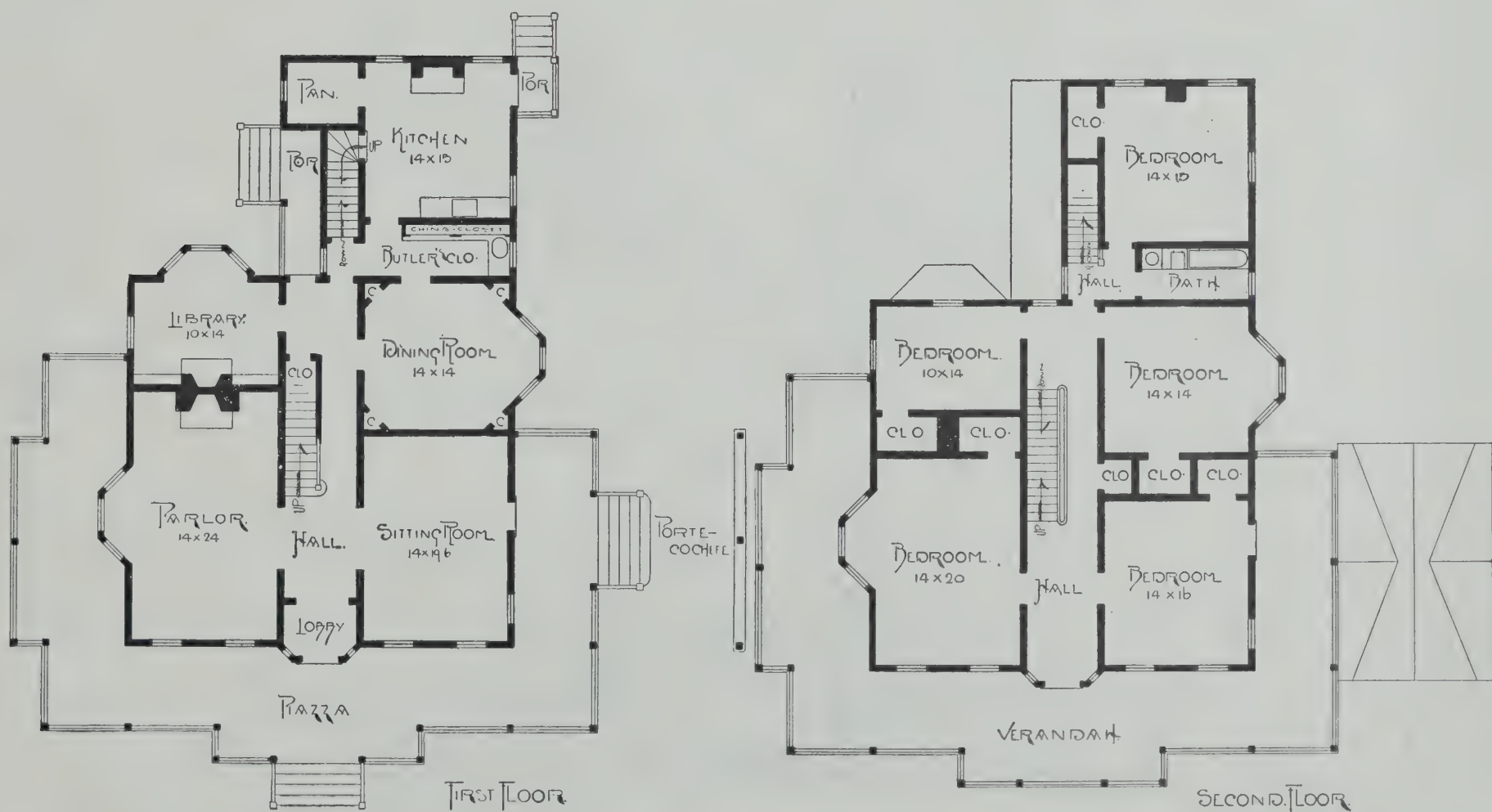


[See page 81.]

A RESIDENCE AT LUDLOW, N. Y.







[See page 81.]

A SUMMER RESIDENCE ASBURY PARK,





**Best Treatment of Hard Wood Floors.**

(Continued from page 88.)

in the better class of houses. They are sanitary and, used with rugs, furnished very effectively. What is the best way to finish them? Made, as you know, of oak, cherry, mahogany, maple, walnut, etc., fill the floor and stain such strips as ebony and dark woods. After the coat of shellac, putty, sand-paper with fine paper, one or more coats of shellac, and afterward rub down with pumice and crude oil.

I have said nothing in favor of floor varnish, shipoleum, supremis and many other finishes for floors; but on these floors a good floor varnish can be used. Why? Because hard usage gives them cause for a frequent washing. They need a good body. These floors need no filler. Give them a coat of hot oil and drier and two coats of varnish. There are several makes I could recommend as having used them with good results, but it is not my purpose to advertise any firm in this paper. If the gloss is objected to, the same can be rubbed down. The objection to varnish on hard wood floors is the shiny and soft nature of the stock, showing nail marks, and in my opinion is not a first-class finish for fine floors. I once saw a reception room floor finished with varnish and rubbed. The plane marks and slight imperfections were brought out distinctly, and it had a coarse look, not like shellac floors, as they are much harder and resist the heel marks. Bathroom floors, in all cases, should be oiled before filling, and finished with a spar or floor varnish, and rubbed to a dull finish. Wax should never be used on these floors. Time is a great factor in finishing floors. As a rule, they are the last job to be finished in a building, and then it is "Hurry, I want to get in." The finisher fills the floor in the morning, puts on a coat of shellac at night, one the next morning, and the floor is finished. How long will it last? No time at all. The fact that he finished it in a hurry is forgotten, the job is a bother and anathemas are heaped on him; partly his own fault. The old adage would apply here, "A job worth doing at all is worth doing well." Be honest with the customer and tell him it should not be done. Give plenty of time between coats to harden; the floor will last longer, and your business will increase by so doing.

Our specifications call on us, many times, to finish maple and ash floors, in kitchens, of dwellings, in several ways—oil finish, as I have referred to, and varnish. But I think it is a mistake to put anything on them except to oil them, one coat, after being laid, with hot oil. When called upon to refinish floors that are not in bad condition, it is well to clean them and repolish with equal parts of raw oil and turpentine, with a chamois or soft cloth. The care is not taken with hard wood floors in our country as in the old, where a great deal of time is spent cleaning and polishing, and soft slippers are furnished the guests.

**THE TWIN STAIRCASE.**

The illustration shows a form of staircase adapted for use in places where space is limited, for two staircases are here provided, occupying less room than would ordinarily be required for one. With this arrangement one of the staircases can be appropriated for parties ascending and the other for those descending. This method of construction is suggested as particularly adapted for cabins of ships, picture galleries, show rooms, and temporary structures where there is likely to be a constant flow of visitors, as it can be put up at comparatively small expense. It is merely an adaptation of the properties of the spiral curve or springing arch. The ascent is steep, there being thirty-eight steps in each semicircular flight, the height being twenty-three feet. The length of the step is four feet, and that of the outer string board thirty-seven feet. The rails are continuous, so that a person ascending and placing either hand on the rail may continue with the same on the rail during the ascent, all the way across the circular corridor which forms the upper landing, and down by the opposite flight.

THE first common schools established by legislation in America were in Massachusetts, 1645; but the first town school was opened at Hartford, Ct., prior to 1642.

**THE ELECTRIC STAIR CLIMBER.**

Electricity in all its forms is entering further and further into the uses of centers of human population, with its various applications to lighting, metallurgy, and to the mechanical transmission of power in manufacturing, and has for the last fifteen years shown incessant progress.

In addition to the important applications of indus-

**ELECTRIC STAIR CLIMBER.**

trial order, there are others of a more modest character which respond none the less to our daily needs, and render a host of minor services.

In this category we mention the interesting electric stair climbers which Mr. J. A. Amiot, the engineer, exhibited this year at the Exposition of Labor at the Palace of Industry, Paris, and which obtained a deserved success.

The electric stair climber consists, essentially, of a car rolling upon two superposed rails and carrying a box, and of an electric windlass which actuates the car through a steel cable guided by rollers.

This brief description, which the accompanying engraving will make better understood, shows the simplicity of the arrangement adopted.

the cable (which is calculated to resist a traction of 13,000 pounds) chances to break. Experiments made at the Exposition of Labor in simulating an accident of this kind always succeeded.

The stair climber has the advantage of occupying, in width, only about twelve inches of the steps of the staircase, a little less than is taken up by a person going up or down—that is to say, in the part necessarily unused for travel. It is, as may be seen, adaptable to all existing staircases without requiring any essential modification or any masonry work. The two rails are simply fixed by bolts to the banisters, which are consolidated thereby.

As for the electric current brought into play, that is feeble, and the conductors that convey it being out of reach of the hand, no shock is possible. The current is obtained by simply connecting the motive apparatus with the street distributing wires. In the exceptional cases in which there is no such line of wires, a gas, petroleum or compressed air motor, or batteries or accumulators, may be installed. The electric installation lends itself naturally to the lighting of every house and staircase independently of the hoisting of visitors.

Let us add that the maneuvering of the electric stair climber is of extreme simplicity. The person who makes use of the apparatus operates it himself, through the shifting of a lever, which he has under his hand, and around which are marked the words, "Up," "Stop," "Down." Buttons upstairs and down permit of calling the apparatus at any point of the staircase where it chances to be, and a peculiar safety device prevents any false maneuvering. Finally, the apparatus stops automatically at the end of its travel, so that no forgetfulness or negligence on the part of the person who is using it is to be feared.

Upon the whole, Mr. Amiot appears to us to have obtained in the stair climber that he has constructed a practical apparatus, which is utilizable on any staircase whatever without much expense and which causes no disturbance in the use of the stairway itself, for it makes no noise and occupies an extremely small space. It affords valuable advantages to the tenants as regards the facility of occupying top stories, and also to the landlord, who will be able to let such apartments more easily.

This apparatus deserves to be classed in the highest rank among the applications of electricity to the house that we alluded to in the beginning of this article, and which are daily continuing to develop in a series of uninterrupted progress.—*Le Genie Civil.*

**The Sick Room Temperature.**

Physicians tell us the proper temperature of a sick room should be from 65° to 70° F., and the heat should not go much below or much above these points. Abundance of fresh air and sunshine is the rule in all cases, except where the order of the physician prohibits the light. There is far more danger of the patient becoming enervated by close, foul air than there is from ventilation. English physicians insist that an open fire is a necessity to the proper ventilation of a sick room, and an eminent authority on this subject says: "I do not consider any room suitable for a patient to occupy during a prolonged illness where there is not an open fire burning on the hearth, in order to secure proper ventilation."

A tight stove or a furnace register will not serve any such purpose. On the contrary, the stove throws out a dry heat which can only be partly counteracted by keeping boiling water on the stove. It does not solve in any way the problem of ventilation. The furnace register too often brings up a current of foul air from the cellar or the kitchen, into which the cold air box opens. Unfortunately it is quite the exception to have the cold air box open outdoors, as it should. Even where it so opens, the furnace register does not assist materially in ventilating the room. One of the best methods of removing odors is to take a shovel

of burning coals, sprinkle it with coffee and pass it around the room. Where there is infectious disease a deodorizing solution should be obtained from the physician and used in the water in which the utensils of the room, the bedding, and clothing of the patient are washed.

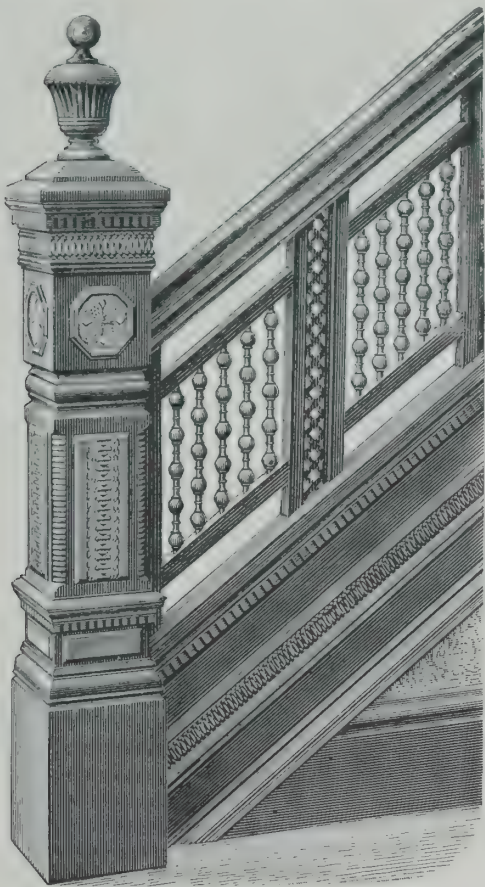
**THE TWIN STAIRCASE.**

The security is complete, owing to the enveloping form of the box, which dispels all apprehension by always presenting to the person who is rising or descending an invariable point of support. Moreover, an eccentric brake stops the apparatus at the top of a step—that is to say, at a height of about nine inches—in case



## STAIR BUILDERS' GOODS.

The design for a stair finish, shown in the illustration, appears in the 1892 catalogue of Messrs. S. E. Smith & Brother, 197 W. Seventh Street, St. Paul, Minn. The company are constantly getting out new designs, of which their catalogue presents a large number, and have the highest class of special machines and machine tools for getting out such work. Their goods are sent to every State and Territory between



DESIGN FOR STAIR FINISH.

the Hudson River and the Pacific coast, including the Southern States, while they also have some trade in New England.

## ORNAMENTAL HARD WOOD FLOORS.

The use of thin hard wood floors, made in a wide variety of ornamental designs and pleasing patterns, is undoubtedly becoming very popular. A portion of the rooms, at least, of every modern house, arranged in good taste to give the largest degree of comfort, should be provided with these hard wood floors, walls, wainscoting, or ceilings. Our illustration represents a few samples of this class of work, such as is produced in the finest grades by the Interior Hardwood Co., of Indianapolis, Ind. Such floors, when well laid, are permanent and improve with age, forming a part of the house decorations. They can be laid on old floors as well as new, the work being done by any good carpenter, and when down require less care than carpets, banishing moths and being decidedly more healthful. The strips and blocks are fastened together in slabs of convenient size, and nailed down with small-headed brads. They are finished with wax or shellac, heightening the natural beauty of the wood, which is well brought out by the contrasting colors of the different varieties employed, and the weaving effects produced by changing the direction of the grain in the perfectly made joints. Such floors are by no means new, having been in use for centuries in palaces and homes of the wealthy in Europe, but at no former period have they been so well made at so moderate cost as they can now be had for.

THE University of Paris was founded by King Philip II. about 1200.

## Large Winding Partition Doors.

A pair of doors of unusual size and novel construction have recently been placed in a church in Paterson, N. J. Filling an opening 39 ft. in width by 11 ft. in height, they can be rolled back at either side and concealed in pilasters 22 ft. by 24 ft. square. This ingenious method of disposing of a door or partition was invented and is now manufactured in Worcester, Mass., a city noted for the variety of its inventions and products. The doors are constructed of narrow strips of wood, securely hinged together by a series of concealed "table leaf joints," and when pushed back, wind about a steel spindle in the pilaster or door casing. The entire width of a room is thus left free when the doors are open, and when they are closed, what was, apparently, one large hall is divided into two separate apartments by handsome, substantial doors, as close fitting and as sound-proof as any door can be. This would seem to be a feature greatly to be desired in the construction of large assembly rooms and double parlors. The same principle is applicable to small doors and to inside blinds, which can be concealed in the side casings, thus not interfering with draperies or curtains.

## The "Alberene" Laundry Tub.

The value of a trade mark as a means of protecting not only the manufacturer, but the community at large, is well illustrated in the case of the Albemarle Soapstone Company (recently at 4 and 6 Peck Slip, New York) with their "Alberene" stone tub.

Their business was started at a time when there was in the minds of many a well founded prejudice against the use of soapstone for the manufacture of laundry tubs (well founded because of the poor grade of stone used and the lack of care in putting the tubs together). Recognizing the weakness of the soapstone then in use in the market, and confident of the real value of their own product, they introduced the most improved methods in the manufacture and handling of their goods, and by dint of energy and push have worked up a large trade in this one specialty.

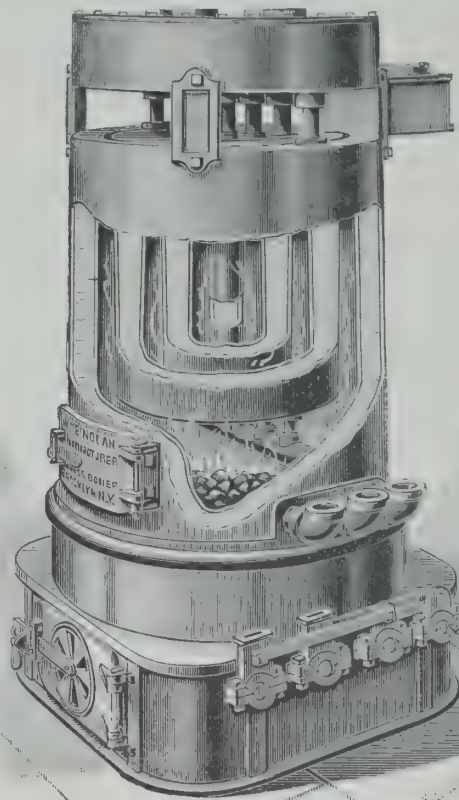
At the start they adopted the trade mark "Alberene" which now appears plainly upon the face of every tub which leaves their hands, thus protecting not only the manufacturer, but the buying public. The company have recently found it necessary to move from their old quarters to a new and more commodious location at 393 Pearl Street, New York.

## House Heating and Ventilation.

The Abram Cox Stove Company, Philadelphia, have recently issued a handsome quarto of 112 pages, in paper covers, on water and air circulation in heating and ventilating. Their special form of heating apparatus, known as the Novelty Circulator, is fully described, with illustrations, table of dimensions, prices,

## NOLAN'S HOT WATER AND STEAM HEATER.

The accompanying engraving shows a novel hot water and steam heater, invented and manufactured by Wm. E. Nolan, of No. 94 Quay Street, Brooklyn, N. Y., which the manufacturer claims has established a record for economy and durability. It is very simple in construction, consisting of a series of hollow annular conical castings, arranged one within the other, leaving an intervening flue space and exposing a very large amount of surface to the direct action of the fire. The



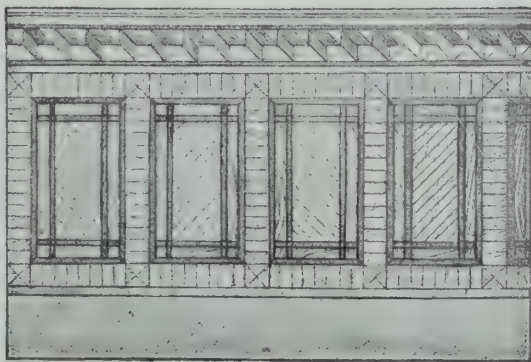
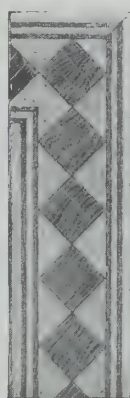
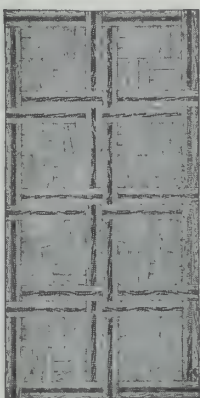
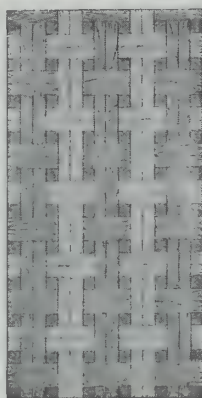
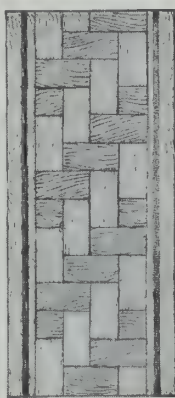
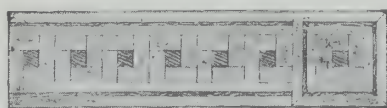
NOLAN'S HOT WATER AND STEAM HEATER.

outer annular section is longer than the other, forming a water leg and inclosing the fire pot from side to side. The grate is of the rocking and dumping pattern, and all the parts are arranged for simple and quick manipulation.

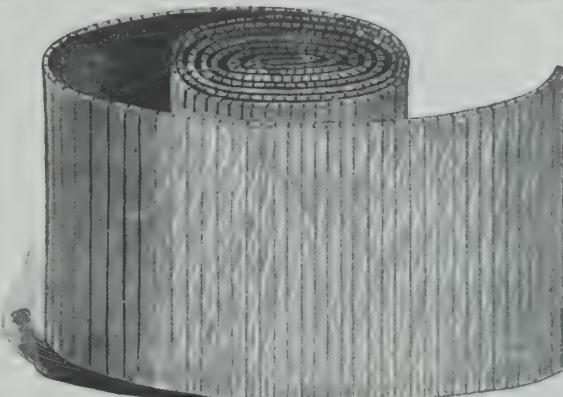
## The Crushing Resistance of Bricks.

The Department of Experimental Engineering, Sibley College, recently received from an Ithaca manufacturer four samples of brick to be tested. All the brick were tested entire and on edge, as they would be used for the purpose of paving. The sides were dressed to parallel planes on an emery wheel, so that the bearing should be uniform over every part. A single layer of thick paper was placed between the surfaces of the brick and the testing machine.

The repressed brick exhibits the greatest crushing strength of any brick on record; it is also superior in strength to sandstone, and fully four-fifths as strong as granite. The tests of stone are usually made on cubes one or two inches on each edge, and such tests show a greater strength per square inch than would be the case if the form of the block was like that of the brick tested; so if the proper allowance for form should be made, there is little doubt but that the crushing strength of the best brick would compare favorably with the strongest granite. The best results from ordinary pressed brick usually show a strength from 6,000 to 10,000 pounds per square inch, so that the other bricks



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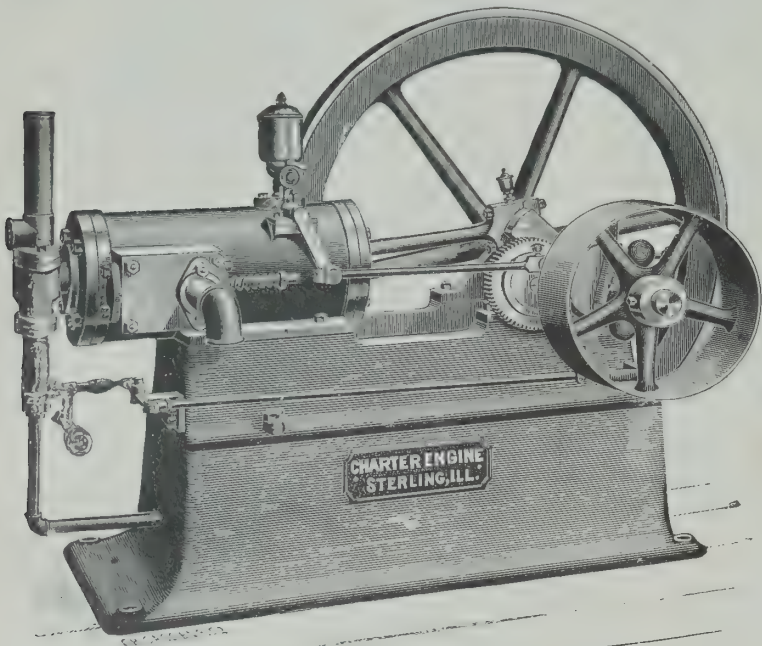
etc., and the book has an introductory chapter on circulation by John J. Hogan. The book also contains a large amount of technical information touching practical heating and ventilating which cannot fail to be of interest to the architect, builder, steam fitter and house owner.

tested, considering the quality and method of manufacture, show an extraordinary strength. No test could be made for wearing qualities, but the brick exhibit, so far as can be determined by striking them with a hammer, sufficient toughness to make them a superior article of paving brick.



## AN EXCELLENT MOTOR.

The accompanying illustration shows a motor which meets almost all conditions perfectly, and which is aptly called "the motor of the nineteenth century." It can be started at any time; uses its fuel in proportion to amount of work done; requires no attention; when stopped all expense ceases; gives perfect immunity from danger of fire and explosion; and operates at an expense of not to exceed ten cents per day to each indicated horse power. There are no ashes, gauges, or pumps to contend with; no smoke nuisance



THE CHARTER GAS ENGINE.

commonly experienced but for a few days in any winter.

From an inspection of the accompanying cut it will be seen there is no cast iron or brick wall partition between the heater's sections, as is the case in the "twinned" boilers of other makes. This construction is peculiar to the Bolton heater, and gives it the great advantage of passing the heat of only one fire box over the entire heating surface of practically two or three heaters, producing ample heat and resulting in a great saving of coal. This operation would be impossible were the heaters built with partitions between sections or entirely separate, necessitating full fire box capacity to be always in use, even on the mildest winter day.

With only one fire box in use, by closing the direct draught damper above the fire and leaving open the one belonging to the unused fire box, the heat, in order to escape, must first pass over and among the pipes composing the heating surface of both parts of the boiler. (As indicated by arrows in cut.) As the water base and top for both fire pots are continuous, a fire in either side of the heater acts directly upon the entire body of water and not alone upon that in its individual section, as is the case with "twinned" heaters.

This company's heaters have been adopted for the Convent of the Visitation, St. Louis, Mo., requiring upward of 27,000 feet of radiation; the new Credit building at Newark, N. J.; the Weinstock-Lubin building, Sacramento, Cal; the Eiser office building, Atlanta, Ga.; the Tallmage & Boyer and Ochiltree buildings, Denver, Col., all very large structures, while the suc-

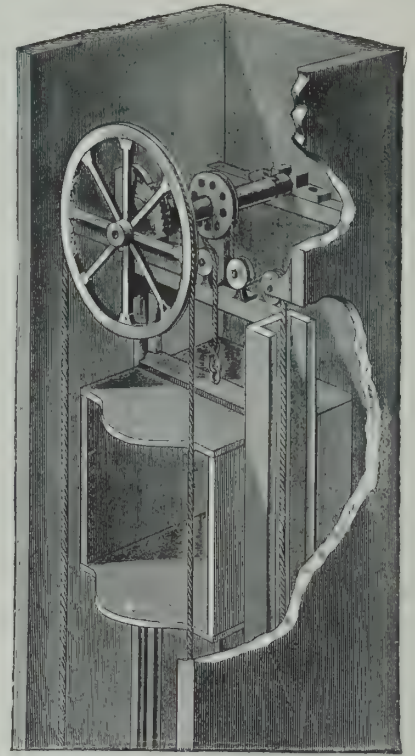
cessfully heated schools, hospitals, churches, etc., in all parts of the country, too numerous to mention, further evince the heater's special adaptability for the very largest buildings.

## The Lacquer Tree.

The juice of the lacquer trees (*Rhus vernicifera*) is the natural varnish upon which depends the famous lacquer work of the Japanese. Specimens of the tree were brought from Japan 16 years ago and planted in the Botanical Garden at Frankfort, where they have flourished and have yielded seeds from which thrifty young trees have sprung. This place now has thirty-four healthy trees, 30 feet high and 2 feet in circumference near the ground. To determine whether the juice is affected by its changed conditions, Prof. Rein has sent samples to Japanese artists for trial, and is having comparative analyses made by eminent chemists. If the reports are favorable, it is expected that the lacquer tree will be quite extensively planted in Germany, and that Europeans will be instructed in the art of lacquering wood by some skilled worker from Japan.

## A SELF-RETAINING DUMB WAITER.

The illustration represents a dumb waiter which is self-retaining without brake rope, clamp, or other fastening, and will not slip. This end is attained by the use of a novel patented side cam and pawl arrangement, which is extremely simple in construction, and not liable to get out of order, while possessing ample strength. Waiters in which this improvement

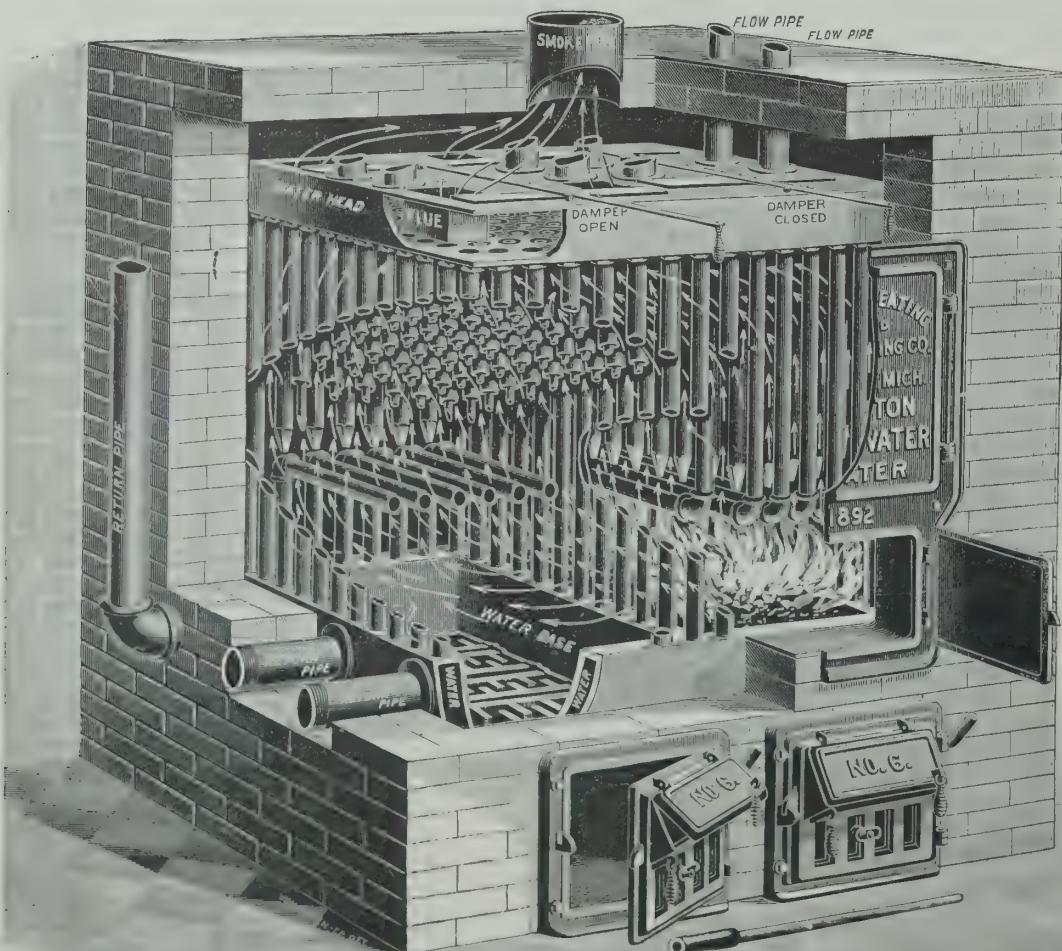


THE "PARAGON" DUMB WAITER.

has been adopted have been in practical use now for about five years, some being in the best of residences and others in flats, tenements, and factories, and they are said to give entire satisfaction in all cases. The waiter will not move down under any increase of the load, and is accessible from all floors at all times, while it is easy, noiseless, and rapid in its working. It is manufactured by F. S. Hutchinson & Co., Sixth Street and West Avenue, Long Island City, N. Y.

## A SUCCESSFUL HOT WATER HEATER.

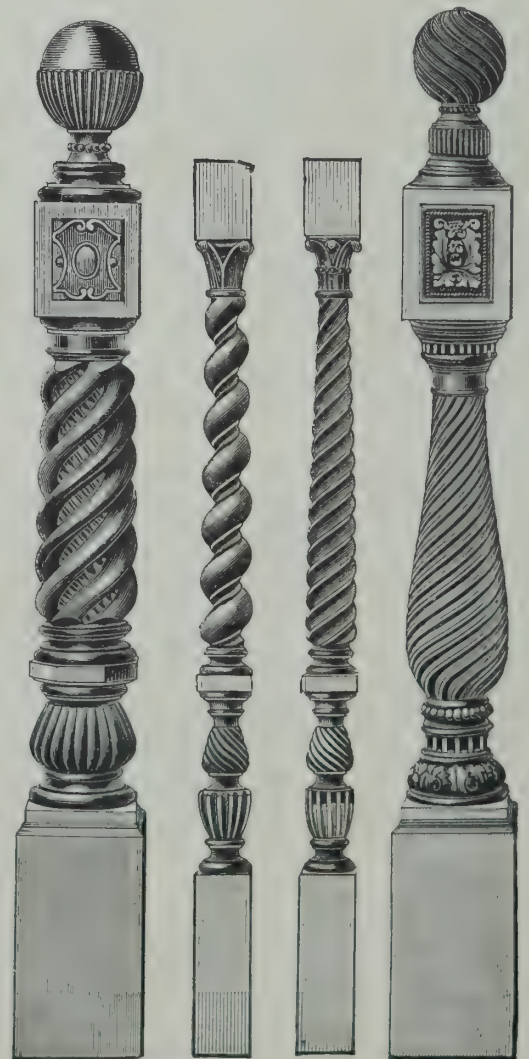
The Detroit Heating and Lighting Company's Bolton Hot Water Heater is manufactured exclusively at Detroit, Mich. These heaters are made in all sizes, having capacity ranging from 400 to 10,000 feet of radiation, adapting them to the largest buildings as well as the smallest residences. Of the many advantages of these heaters, one in particular is the economy in fuel of the double and triple fire pot sizes. For ordinary winter weather when a heater's full capacity is unnecessary to maintain comfortable temperature these heaters are great fuel savers. A great saving in coal is accomplished by using only one-half or one-third of their fire pot capacity, while the remaining unused fire boxes are kept in reserve for the extreme weather



THE BOLTON HOT WATER HEATER.

## ARCHITECTURAL WOOD TURNING.

The accompanying cuts show some of the new patterns of newels and balusters which have lately been brought out by Adam Dickey, of 43 Bristol Street, Boston, Mass. Mr. Dickey makes a specialty of work for architects' designs, and has on hand at all times and ready for immediate delivery a large stock of solid and built-up newels and stair rails of all dimensions. He issues an illustrated catalogue, which will interest all contemplating building.



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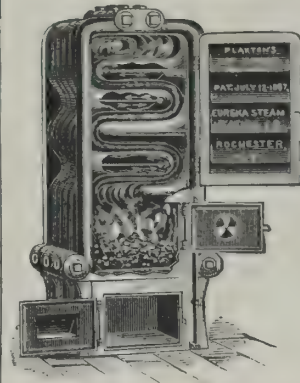
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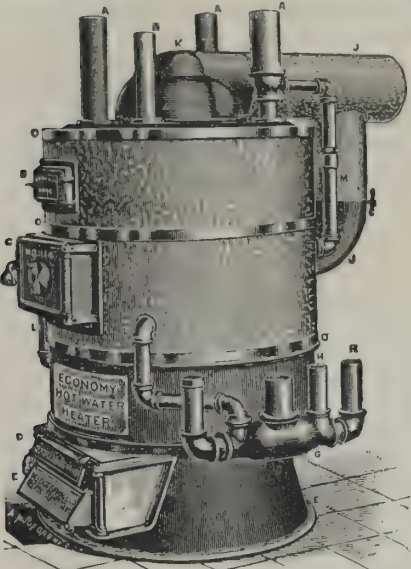
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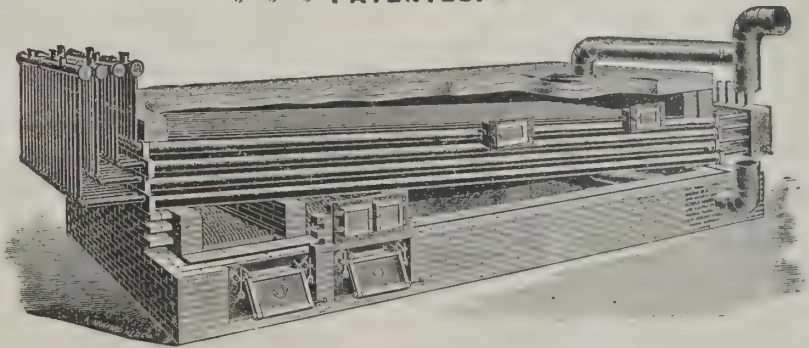
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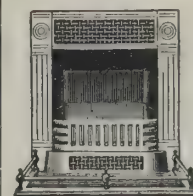


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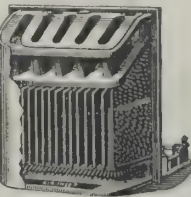
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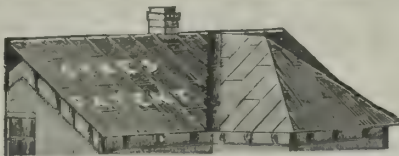
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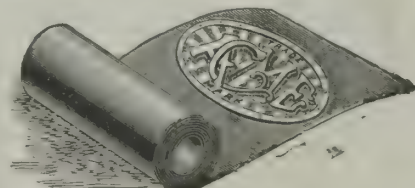
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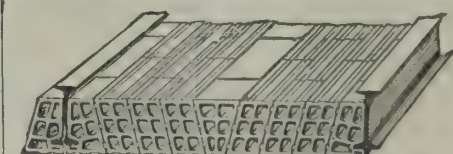
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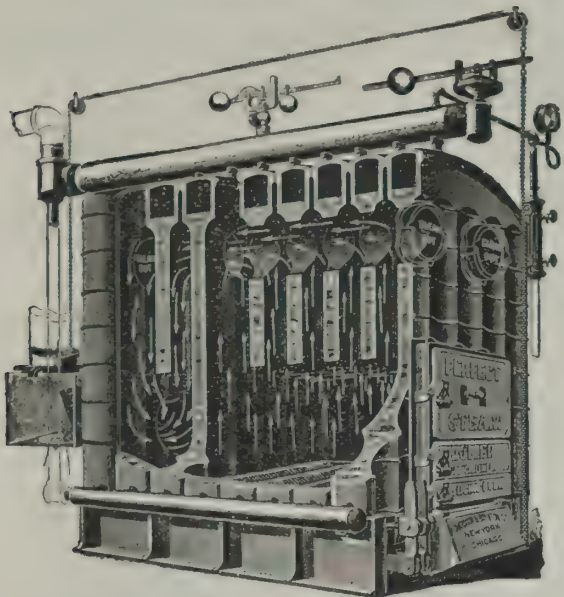
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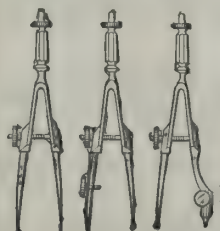


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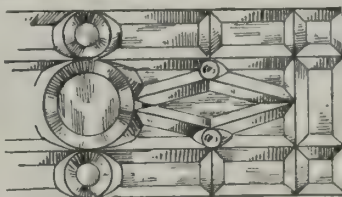
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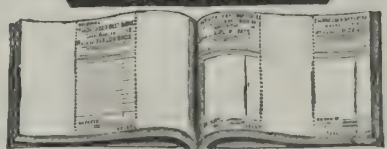
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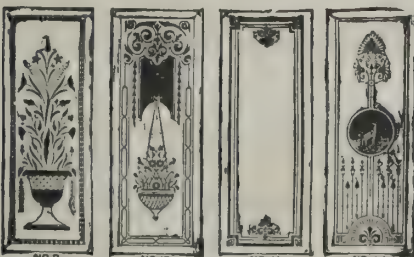
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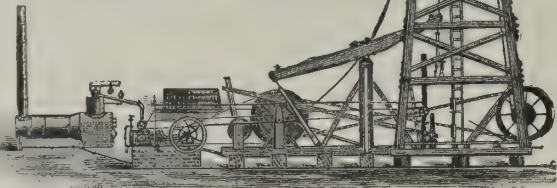
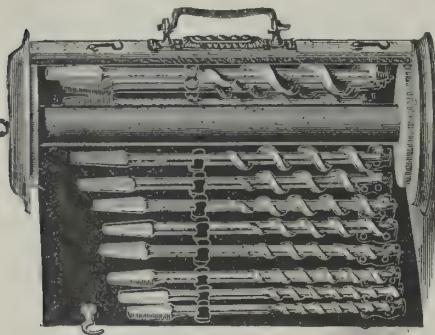
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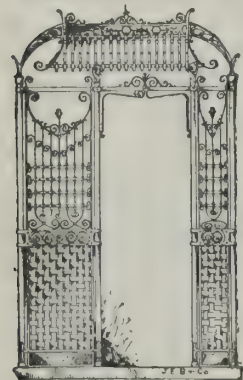
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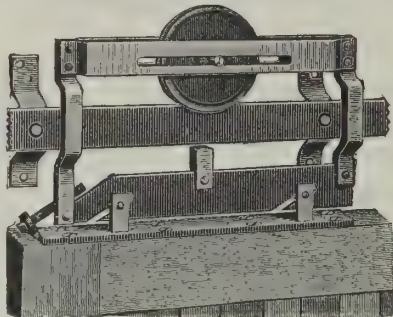
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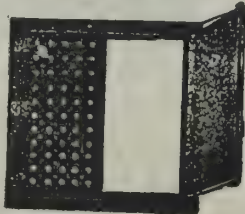
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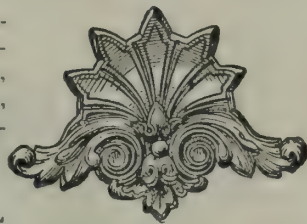
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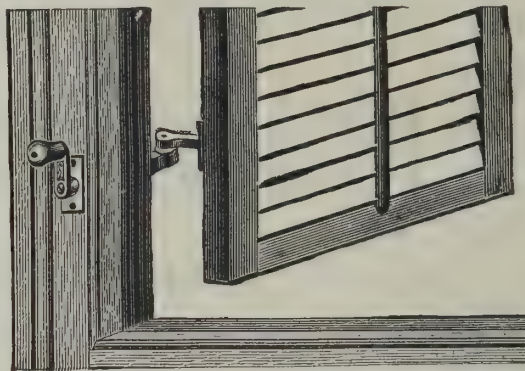
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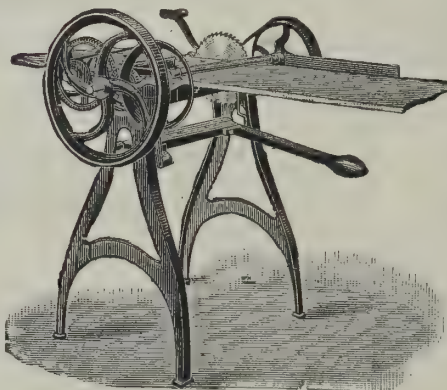
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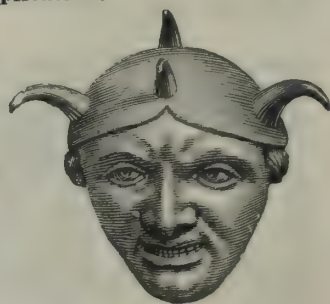
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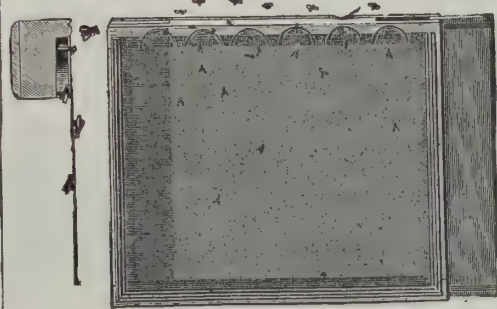
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Address correspondence to the Company's office at Bethlehem, Pa.

(Continued from page iv.)

that lightning never strikes twice in the same place, yet in this case it does not indicate mineral attraction. The great stones weigh about 1,000 tons. Captain Eads' ship railway was to carry several times this weight across the isthmus. The Great Eastern was the greatest block that modern engineers ever stumbled on, beside which the stone blocks are pygmies. There were probably other preservatives than salt used on the mummies. The dry air of Egypt was the principal preservative.

(2) E. D. W. says: A fence is to be built over a half circle hill. Another over a straight line being the exact diameter of the above half circle. The specification calls for posts placed 2 feet apart. Which job will require the greatest number of pickets? A. If the pickets are placed vertically, it will require the same number of pickets for both jobs. Not so with the rails, as is self-evident.

(3) H. R. writes: I am making some blue enamel for enameling iron ware, made of sand, borax, potash, and cobalt oxide. When ground into a pulp there is a white scum on the top of the enamel. Can you let me know the cause of it? Can you give me a receipt for blue enamel? Is there any book published on the manufacturing of glass and enameling? A. Fuse the mixture, pour while fused into water and grind it. This will give it greater uniformity and avoid the scum. The "Scientific American Encyclopedia of Receipts," \$5 by mail, gives a great deal of information on this subject.

(4) J. H. J. C. writes: How to ascertain if water that flows and stands in galvanized iron pipes contains a solution of zinc. A. Concentrate by evaporation, add a slight excess sodium hydrate, filter if necessary, and pass sulphureted hydrogen through it. A white precipitate indicates the presence of zinc.

(5) M. O. R. says: I am building nearly two miles of fence. Oak pickets  $\frac{1}{2}$  by 2 inches 4 feet long, woven in five pairs of wire, Washburn & Moen galvanizing process, in which the zinc is fairly soaked through the iron. Having some doubts as to durability of the oak pickets, I wish to apply some preservative which will not injure the wire, but preserve the wood. Would the Bordeaux mixture (sulphate of copper in a whitewash of lime) do? Is the copper salt injurious, or the lime, or both? Will you suggest something superior? A. There is no objection to the Bordeaux wash. Another way is to use 2 pounds sulphate of zinc and 1 pound salt to 30 pounds dry lime, and color if desired with yellow ochre, or any cheap mineral paint. To give the above a strong body a half pound of glue may be added, dissolved separately. You may also add a little glue to the Bordeaux mixture to advantage. If appearance is no object, coal tar is the best preservative. The whitewashes are not injurious to wood or wire.

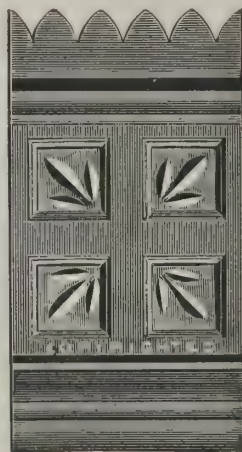
(6) N. C. H. asks: 1. Will you please explain to me the philosophy of the silo? Why is it the ensilage does not spoil? A. The preservation of

(Continued on page viii.)

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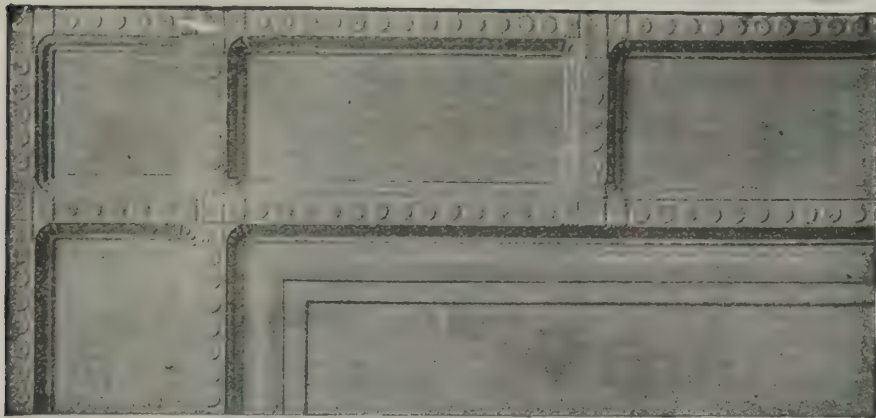
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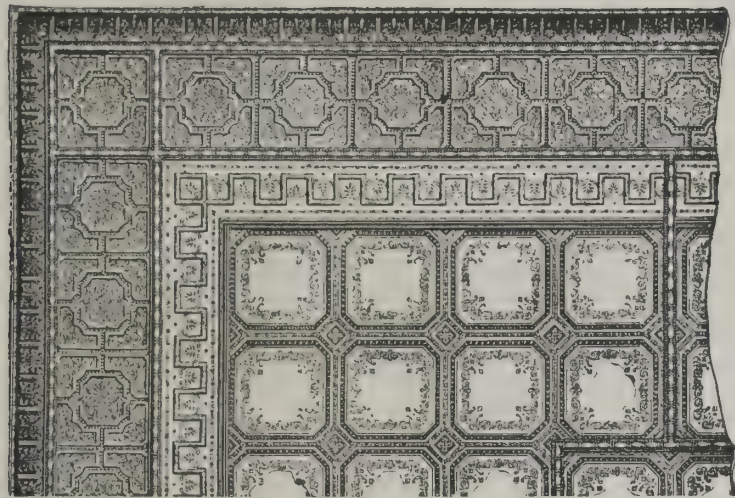
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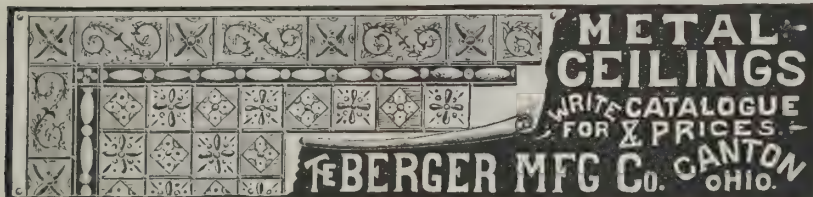


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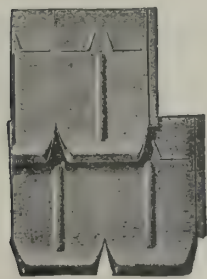
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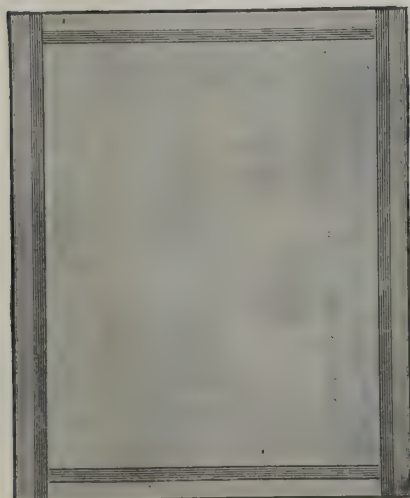
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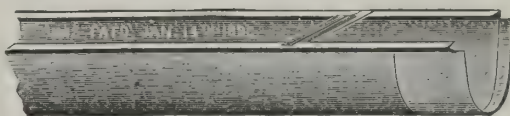


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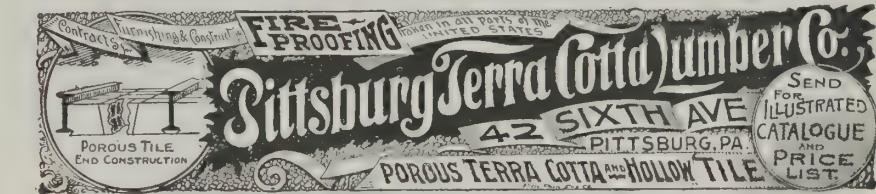


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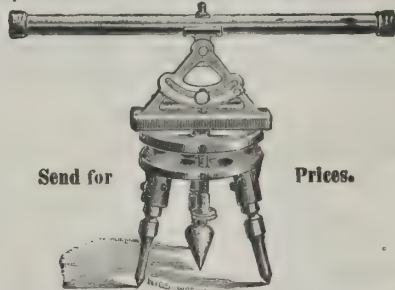
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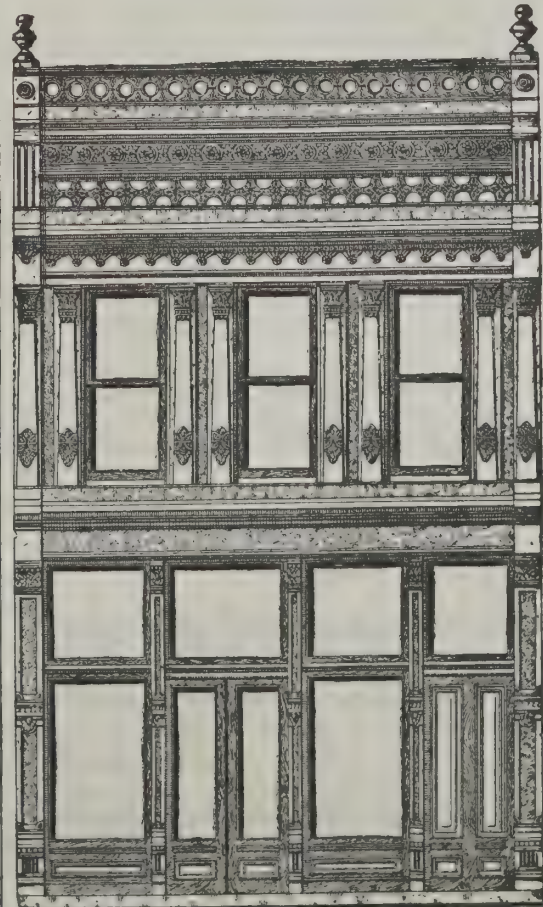


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The territory for this kind of work is as thick as the stars in the sky, while it can be made with very little expense. It is a pleasant business, where industry, vim, and good profits vie with each other. I have been indirectly instrumental in learning a number of young men the art of making the sidewalk, and now they are making from \$2.50 to \$5.00 per day for their services; while I also have sold my formula to several business men that have shown a spirit of enterprise in soliciting for work in their respective towns, and they have been more than pleased over their efforts. My price for printed formula is \$25.00, and \$10.00 extra for tools. My reference is the Mayor of this city, as well as the following cities in this State, viz.: Springfield, Jacksonville, Quincy, Pana, Carlinville, Champaign, Monticello and Paris. I have done work in all these cities, and the work will speak for itself. I invite correspondence from those interested. Send for Illustrated Catalogue for Architects and Builders.

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**DIAMOND WALL FINISH CO.,**  
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(Continued from page vi.)

food in the silo depends mainly on the exclusion of air. This is accomplished by placing over the ensilage a movable close-fitting cover and weighting it heavily. 2. Will you tell me of a good confectioner's receipt book and where to get it? A. The following are good books on confectionery: "Confectioner's Hand Book," price \$3; "Complete Practical Confectioner," price \$4; "Ornamental Confectionery," price \$2. We can send you either of these books on receipt of price.

(7) J. S. S. asks: 1. What is the cause of the bursting of an emery wheel when running at a high speed? A. It is generally due to lack of cohesion among the particles of the wheel, the wheel having insufficient strength to withstand centrifugal force. The remedy is obviously stronger wheels or less speed. 2. What effect would the opening of a window have upon a vulcanizer, with the pressure above the limit of safety, the cool air blowing through the window on the vulcanizer? A. The tendency will be to cool the vulcanizer and reduce the liability to explosion. 3. How is the specific gravity of a body obtained? A. Specific gravity is obtained by weighing the body in air, then weighing in water and dividing the weight in air by the loss of weight in water.

(8) H. M. B. says: Two miles from the city of Quito in Ecuador, and 1,600 feet above its elevation, there is a waterfall that would fill a pipe 12

(Continued on page xii.)

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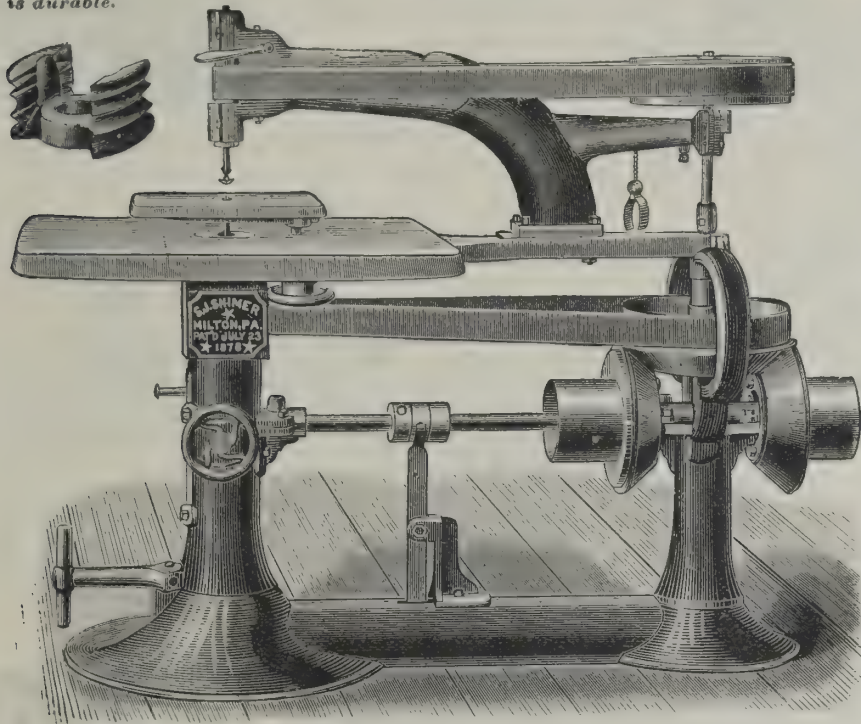


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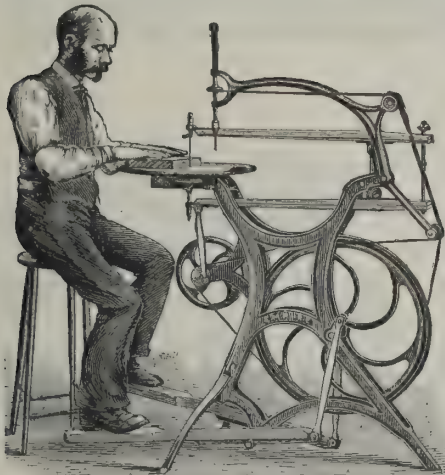
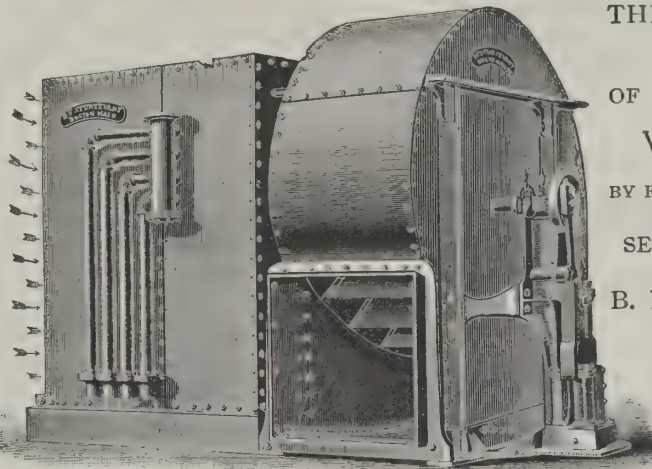
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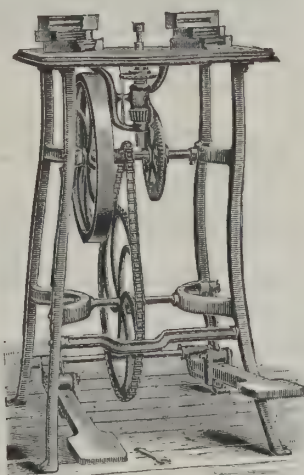


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For moulding or shaping edges of work. Has iron frame, steel spindle and shafts, hardwood table, powerful treadle motion, adjustable spindle, machine cut gears, chain belt, etc. Weight, 125 lbs.; boxed, 215 lbs.

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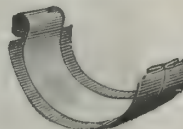
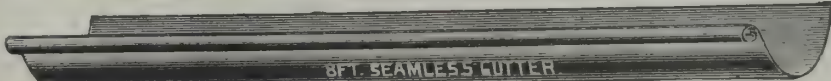
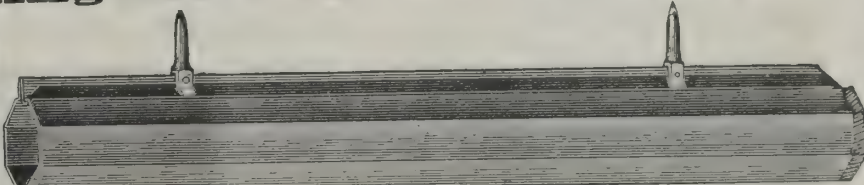
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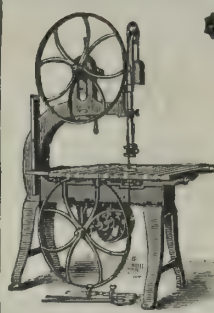
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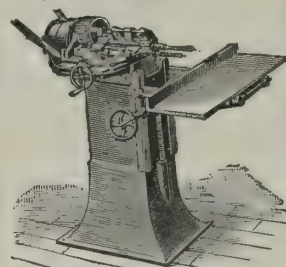
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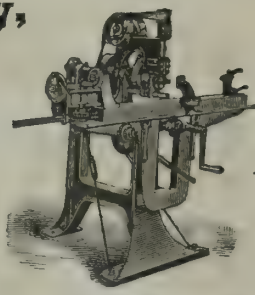
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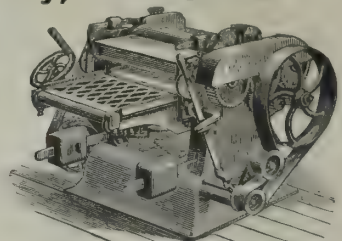
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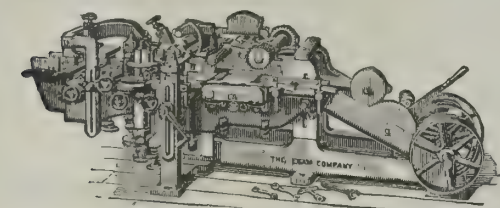


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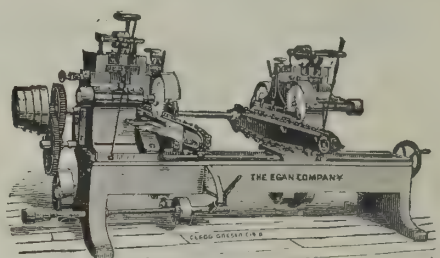
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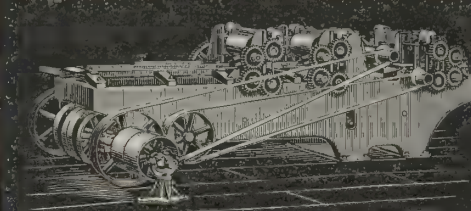
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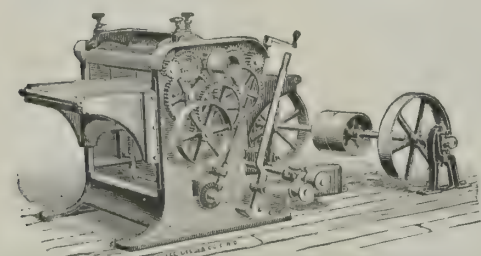
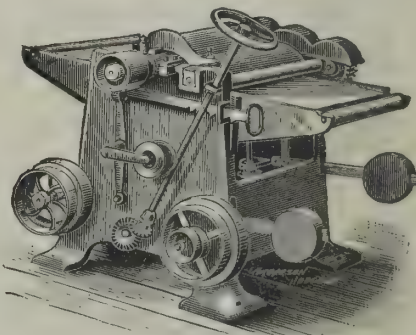
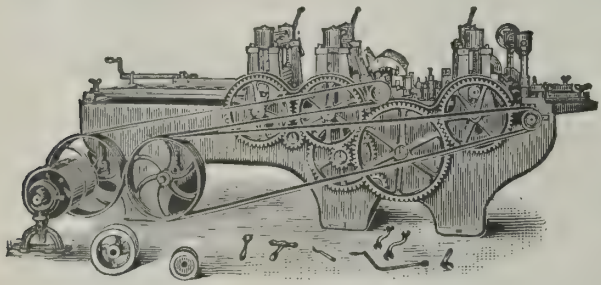
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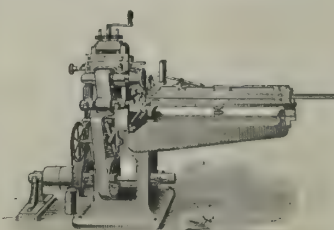
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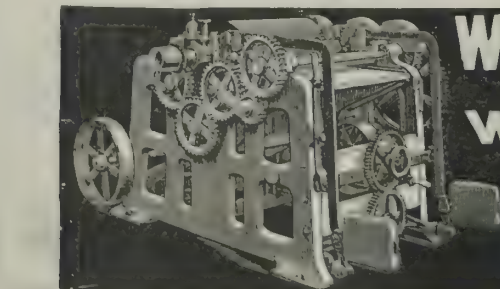
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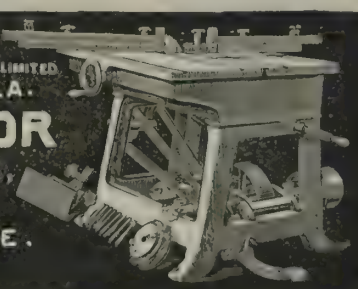
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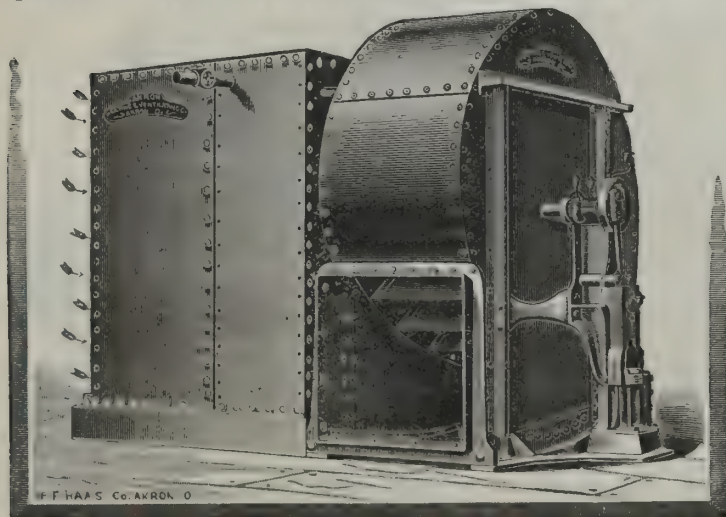
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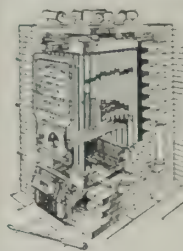
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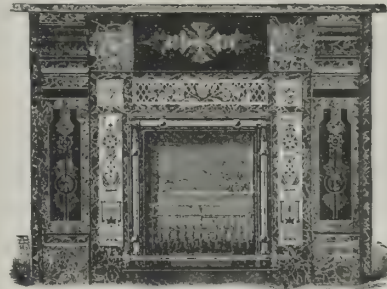
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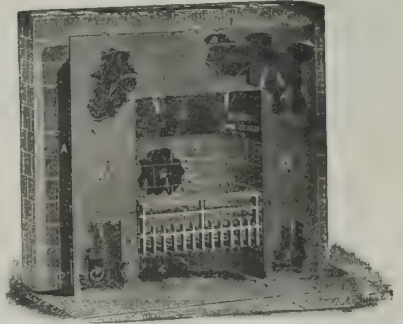


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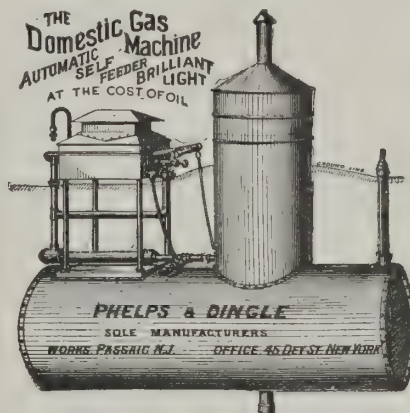
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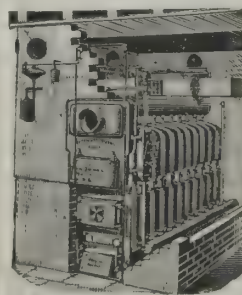
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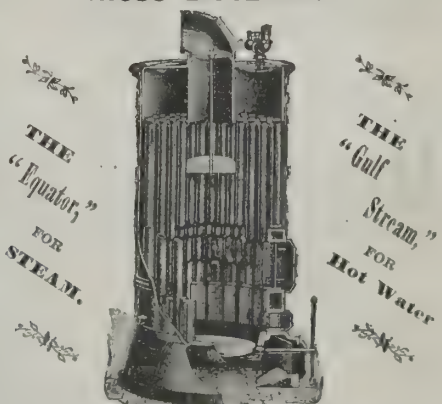
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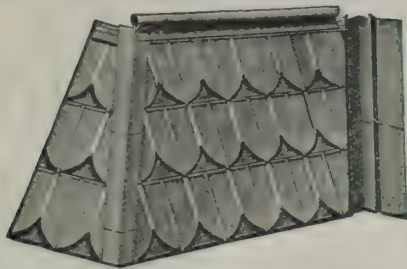
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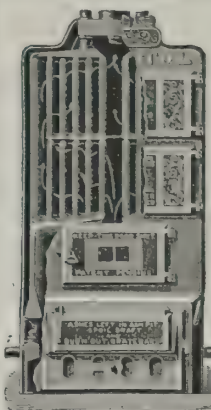
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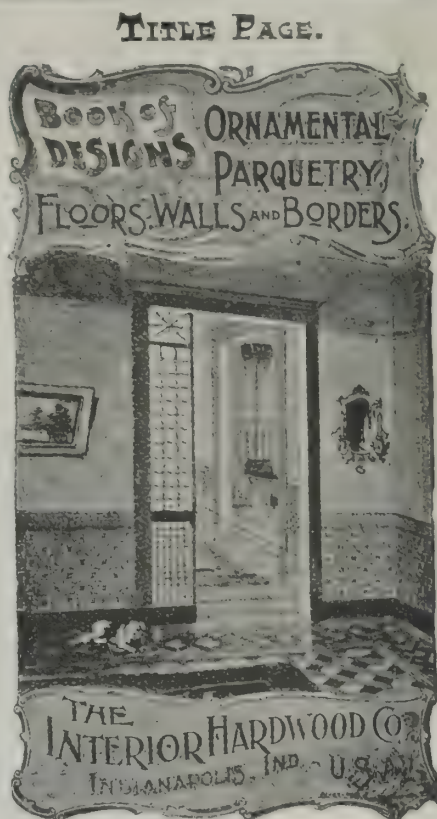
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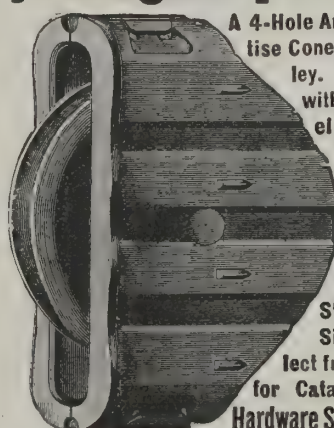
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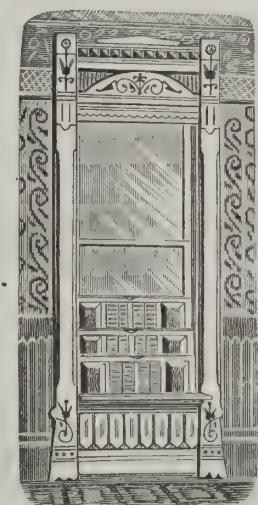


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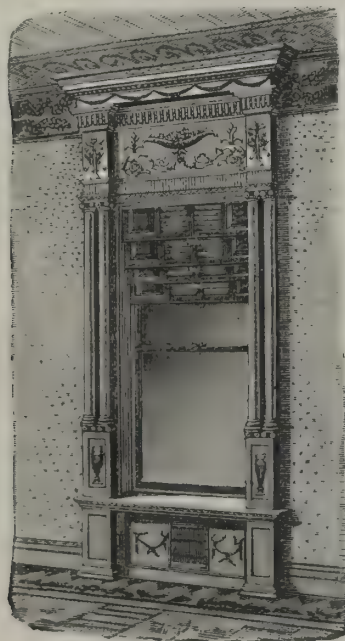
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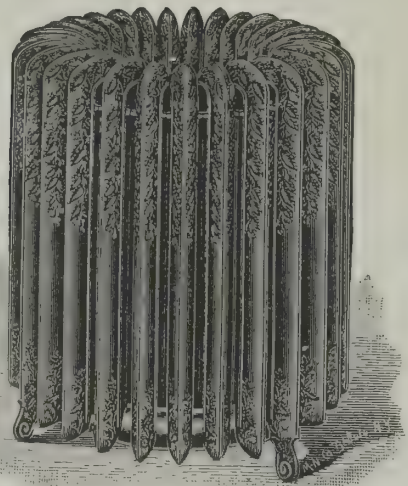
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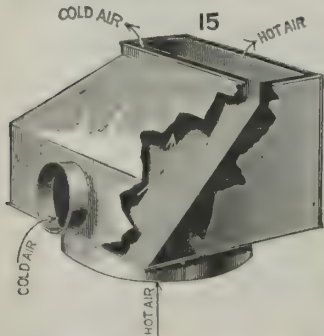
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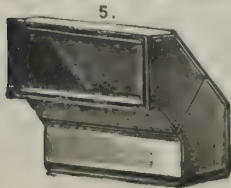
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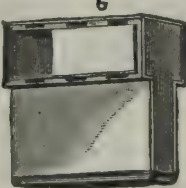


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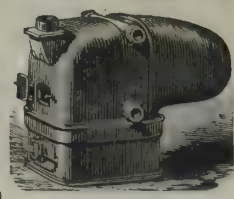
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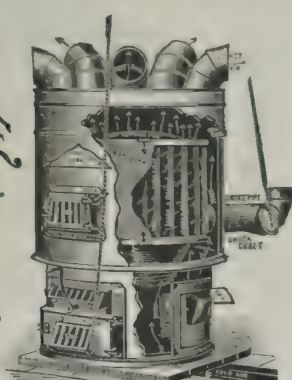
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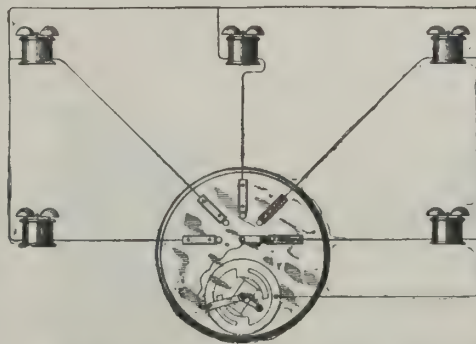
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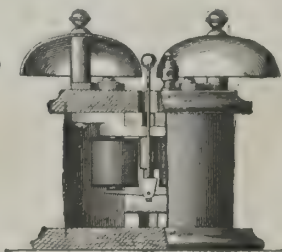
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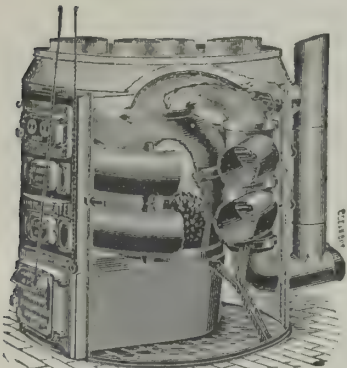
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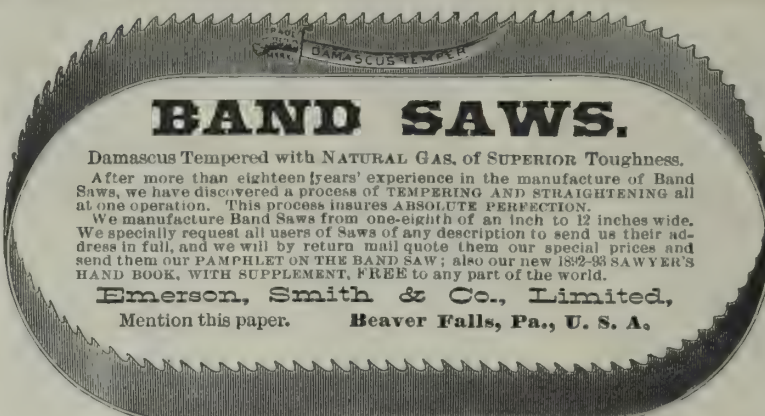
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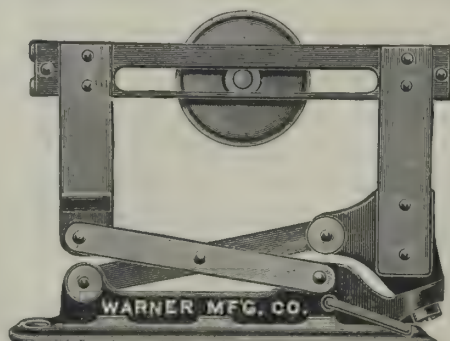
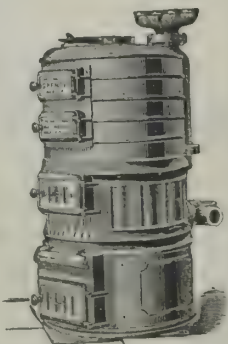
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